The Builder.

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The Pollution of the Thames, and its Influence on Health, Wealth, and Commerce.

THE Report of the Royal Commission to inquire into the pollution of the River Thames by the discharge of the sewage of the metropolis, which was laid on the tables of both Houses of Parliament at the commencement of the session, has given the force of deliberate counsel to conclusions long since anticipated by impartial inquirers. Properly speaking, indeed, there was no question open on the subject. If the crude sewage of a city containing more than four millions of inhabitants could be poured into a river of the modest size of the Thames, without serious ill effects, it is plain that the whole theory and practice of modern sanitary improvement must be a mockery, a delusion, and a costly humbug. The case has not hitherto been investigated on its merits, but has been fought out on party lines. The Conservators of the Thames have been ill advised. With an unanswerable case in their hands, they adopted a mode of treatment which courted defeat. It encountered what it thus courted. The Conservators protested too much. They fought, to some extent, against themselves. For a series of years they have been carrying on operations in the Thames which are steadily improving the channel of the river below London. The tidal range has materially increased under their well-designed and well-executed efforts, and is still annually increasing. Gradually and systematically the shoals and shallower portions of the channel have been removed and deepened, and the improvement of our most ancient and most famous river harbour has fully kept pace with the improvement in our modern navigation.

Coincident with this material improvement in the channel of the Thames has been the deterioration of the river from the discharge of the sewage of the metropolis. This deterioration has been of a two-fold kind, chemical and physical. These two sources of mischief were each capable of actual proof. But, while the chemical evil is one that can be tested, day by day and from place to place, the physical evil is more difficult, not only of proof but of determination. We can, indeed, calculate what minimum quantity both of inorganic and of decaying organic matter is daily thrown into the channel of the Thames; but how much of each is daily swept away is a matter of constant variation. It depends on the three elements of tide, of wind, and of land flow and flood. That it effects no permanent lodgment, except in exceptional cases, is to be anticipated from the very fact of the steady improvement of the river by the Conservators. Thus, while evidence is at times attainable of the formation of masses of foul mud at given localities, every one who is familiar with the action of tidal rivers knows that where a bank is formed to day it may be sought in vain to-morrow. In the case of the Mersey it is in evidence that where an engineer has stood one day on firm dry sand, he has found on the next day sixteen feet of water.

For this reason the attempt of the Conservators of the Thames to prove that the Barking outflow was choking up the river was an error. One day it might be shown to do so, on the following spring-tide improvement may have got the better of deterioration. Two forces were at strife, with variable results; but as, in the long run, the *plus* force is stronger than the *minus*, any attempt at the independent determination of the latter must be futile. The greater the success of the Conservators of the Thames in the discharge of their duties, the more difficult was it for them to show to what extent they were impeded by the action of the Metropolitan Board of Works.

That several years would have been saved if the Thames Conservators had followed the advice that recommended them to give their main attention to the chemical, rather than to the physical, part of their case, is now proved by the report of the Royal Commission. In temperate and well-balanced language the Commissioners have now given the sentence of an impartial tribunal. That sentence has established facts as to which it is difficult to see how any serious doubt could be at any time entertained. But it is one thing to have a good case, and quite another to be so served and advised as to put that case in its true light. Without now referring to past efforts to that effect, it is satisfactory to be able to sum up the conclusions of the Royal Commission.

That the discharge of the sewage of London in its crude state into the river, during the whole year, is at variance with the understanding in Parliament on which the Act of 1858 was passed, is the first statement of the Commission, in point of order; and is one of no little importance by way of clearing the ground. It is, of course, well known to those who have studied the facts, but the opposite has been the contention of the Metropolitan Board of Works. Further, as to this, the Commissioners report that "the sewage from the northern outfall is distributed partly over the foreshore, and not, as was the original intention, through submerged pipes terminating below low-water mark; this arrangement increasing the risk of nuisance from the discharge."

In accordance with what might be anticipated from the above facts, the Commission find that "the discharge from the main outfalls becomes very widely distributed by the motion of the water both up and down the river; being traced in dry seasons through the metropolis and almost as high as Teddington." Between Greenwich and Greenhithe, that is to say for about seven miles up, and ten miles down the river from the discharge at Barking, "the effects of the sewage are more or less apparent at all times," while in dry seasons, and at neap tides, "the dilution of the sewage is scanty and ineffective." Oscillating up and down the river, the mass of sewage becomes partially purified by oxidation, the limits of such partial purification varying with the meteorological conditions. But that at Erith, and elsewhere, foul mud, partly composed of sewage matter, accumulates, and adheres to nets, anchors, and other objects dropped into it, that sand obtained from parts of the bed of the river where it used to be obtained in a pure state is now so contaminated with sewage matter as to be unfit for use; and that fish have disappeared from the Thames for a distance of some fifteen miles below the outfalls, and for a considerable distance above them, are facts of unmistakable significance, which are now fully established by the Report of the Royal Commission.

A new and very important statement is contained in the Report, to the effect that wells in the neighbourhood of the Thames are affected by the water of the river. Thus although it has not been shown that hitherto the sewage discharge has had any seriously prejudicial effect on the general healthiness of the neighbouring districts, there is evidence of evil effects on the health of persons employed on the river. "There may reasonably be anxiety on the subject for the future," more especially as "the evils and dangers are likely to increase with the increase of population in the districts drained."

Thus far the report deals with the sanitary dangers to which the metropolis and the riverain residents of the Thames valley are exposed by a mode of dealing with the sewage of the metropolis which can only be described as a scandal to our legislation. Nothing above cited (except what is said as to the wells) is new. There is nothing that has not

been repeatedly urged before in our columns, and in many other places. And we are bound to add that there is also nothing, or at least very little, that has not been flatly denied by the advocates of the Metropolitan Board of Works. It was not the case that any honest doubt existed in the matter. But disputes did exist. Every statement of the defenders of the purity of the Thames was either ignored, contradicted, or ridiculed. The evidence of those persons who went on an unsavoury pilgrimage to Barking or to Erith was frittered away by expert cross-examination. The main drainage of London, we were told, was one of the most brilliant engineering works of the century. Who would set the grumblings of a few anglers or painters, or occupants of damp and mouldy riverside hovels, against such a noble measure? And this view, as being enforced by a body of the preponderating weight of the Metropolitan Board of Works, has hitherto, as far as the general course of public opinion is concerned, quite overborne and obscured the truth.

This, however, is by no means all. Quite independent of the aspect of the sanitary influence of the condition of the river on the residential population, is that of the corresponding influences on commerce. "For these reasons," the Commission report, "the river is not at times in the state in which such an important highway to a great capital, carrying so large a traffic, ought to be." Is that traffic a matter with which to trifle? What is its actual amount? In the year 1881 the tonnage of British and foreign vessels, sailing and steam, with cargoes and in ballast, that entered and cleared the port of London, amounted to 9,388,000 tons, or between a sixth and a seventh of the corresponding tonnage for the whole United Kingdom. If we look back as far as the statistical abstracts for the United Kingdom enable us to do,—that is to say, to 1867,—we do not find that London, as it is, is maintaining her ancient pre-eminence as a port. Her total tonnage has, indeed, increased by 50 per cent. in fourteen years; but the tonnage of the United Kingdom has increased in that period from 36 to 58 millions of tons, or by more than 60 per cent. And what has been the increase in those ports on which the skill of the engineer has been employed for the service of navigation? The number of vessels of 500 tons and upwards cleared from the Tyne in 1861 was 246. In 1881 it had risen to 4,625, being an increase, in twenty years, of 1,780 per cent.! On the Clyde, the total tonnage entered at Glasgow in 1831 was 732,327; in 1881 it was 3,057,533. In 1831 the tonnage of vessels at Liverpool was 1,592,436; in 1881 it was 7,893,948. A traffic of magnitude nearly equal to that of Liverpool has been created through the Suez Canal in thirteen years. In 1870, the year of opening, the ships that passed were 486, with an aggregate tonnage of 436,000 tons. In 1882 the ships were 3,198; the tonnage, 7,122,000 tons. Ports and harbours, and inland waterways, cannot afford to go to sleep in our days. They must either advance or decline. The clearances from Liverpool in 1881 were positively more than those from London; the figures being 4,796,671 tons from the Lancashire port, and 4,478,260 from the capital. Can it be contended that the neglected state of the Thames, from the shores of which so much of the shipbuilding industry has fled to the banks of the Clyde, the Tyne, the Wear, and the Tees, has nothing to do with this displacement of the centre of commercial gravity?

The Commission have resolved, as it seems to us very wisely, to allow some time for the consideration of their report before they proceed to inquire as to "what measures can be applied for remedying or preventing the evils and dangers resulting from the sewage discharge." This caution, opposed as it is to the frantic haste with which measures for dealing with great engineering systems, such as that of the water supply of London, are flung on the table of the House of Commons, may well be imitated by other bodies. And at the present moment there is an especial reason for the caution. It will be impossible to deal adequately with the subject of metropolitan sewage without in some degree entering into the co-related subject of metropolitan water supply. The quantity of water that was supplied by the eight great metropolitan water companies in 1882 was 141⅓ million gallons per diem, being more than one-third of Mr. Beardmore's estimate of the ordinary daily flow of the Thames. Of this about half is actually pumped out of the Thames, diverted through the water pipes and sewers of London, and returned to the river at Barking in the shape of sewage, together with an equal quantity of similarly polluted water from the New River, the River Lea, and the springs of Kent, and the polluted storm water when it rains. In any project for dealing with outfall, due attention must be paid to inflow, and what at the present moment is of cardinal importance in this respect is, that such a change has taken place in public opinion on the subject as must lead to disastrous results, unless it be brought under the control and revision of some such impartial body as the Royal Commission.

In all the provisions for the water circulation of London, including both supply and sewerage or discharge, it has been up to this time assumed that the more water that is run through a house and its drains the better for the public health. Thus, not only has the large supply of from thirty to forty gallons of water per head per diem been encouraged by the Legislature, but the very basis of legislation has been the assumption that such a circulation was in the highest degree desirable. Thus all the laws as to water-rates have been passed with a two-fold object; first, to encourage the largest possible water supply, by charging, not per ton of water used, but in proportion to the rateable value of the property supplied with water; and, secondly, so to distribute the rating that, to a great extent, the more wealthy inhabitants should pay for the supply of their poorer neighbours. Thus the aristocratic district watered by the Grand Junction Water Company charges 1½d. per metric ton of water supplied, while the poorer district watered from the River Lee only pays 1d., and a similar disparity will be found to exist between the richer and poorer neighbourhoods in the same water districts. In fact, the rule has been payment on value of property, not on consumption of water. The reason has been that, if the latter had been taken as the gauge for rating, the poor would not have used a gallon that they could have spared, and thus the water circulation would have been diminished, the outflow checked, and the sewage would have been less diluted.

It is unnecessary, for the moment, to attempt to discuss the question as to which of these two principles is the true one. Much may be said on either side. But two points are essential to bear in mind. First, there is a conflict of principles. It may be well to encourage a consumption of forty gallons of water per head per diem, or to seek to restrict it to seven or eight gallons. But the two aims and objects are incompatible. Secondly, the first of these objects having been hitherto assumed as proper, and the water legislation of London having been based on that assumption, it is not only vain, but reckless, to attempt to overset the arrangement by a side wind, as the Corporation of London proposes to do by their Water Bill. The actual quantity of water consumed in a house is only one element of the cost of water supply to that house. The working expenses of providing that supply are only about half the whole expenses of the provision. And of these working expenses, those dependent on quantity,—viz., pumping, filtering, and storage, form less than forty per cent. Out of the present cost of 7½d. per 1,000 gallons of water supplied over the entire metropolis, the three items thus dependent on quantity amount to only 1½d., or rather less. Thus, any idea of effecting a saving of expenditure at all corresponding to the saving of water is only based on a total ignorance of the problem which it is proposed to solve. It may be,—or it may not be,—better to effect an entire change in the principles of the supply of water for sewerage purposes. For the last forty years at least the aim of the Legislature has been to stimulate that supply. What the poor consumer would avoid as unnecessary, if he had to pay for it, is supplied by Act of Parliament in such a manner that it is not his interest to stint the water that he draws. What one person calls waste, another person calls sanitary supply. The matter perhaps requires threshing out, but the main point is, that any change in the present regulations can only be safely effected in view of all the conditions of the problem. It is no more possible to supply ten gallons of water per day at the same price per gallon as forty gallons, than it is to effect any other of those marvellous economies that seem so simple to persons who are ignorant of the controlling rules of any kind of industrial enterprise.

DRAWINGS AND PICTURES OF CATHEDRAL CHURCHES.

IT is, no doubt, reasonable that in estimating the success of a painter, due regard should be paid to the difficulties of his subjects; and of all the many subjects for the artist there is perhaps none which presents more difficulties than the faithful and intelligent representation of architecture. In saying this we do not overlook the subtle play and variety of line and expression in the human form, or the multitudinous complexities and fitful, changing aspects of natural landscape. In these the organism of each class is constant under an infinite variety of accidental differences, and the characteristic structure and anatomy of a man, as of an oak, can be deliberately and leisurely studied, and once mastered is for ever known. But one building differs from another both as to its external dress and as to its organic structure, and the differences are not merely "skin deep." The painter who would give us a satisfactory portrait of a fine building must appreciate the *rationale* of its frame and the part which every structural line plays in the general economy of the fabric. He must get at the idiosyncrasies of each specimen, and identify himself with the mind of its designer, and for this the closest and most critical study of a very complex problem is essential. On the other hand, there is a danger in being over-wise. The painter of architecture must be something of an architect, or he will not really *see* what the building he would represent has to show to him. The entire absence of all knowledge of Gothic art in the last century led the best of painters who had *wit* enough to admire its graceful and forlorn beauties to misrepresent grotesquely the very features which charmed them. But architects make bad painters of a subject of which they well know all the details. In fact, they know too much, and paint what they know to exist rather than what they see, so that the completeness of intimacy with architectural minutiæ which is invaluable to them as architects is fatal to their success as painters.

To turn to their fullest account the opportunities which architecture offers to the painter, he must be also something of a poet, and represent the works of his brother artists under those effects, and in those associations, which will best bring out their spirit. "The gay beams of lightsome day" are not always the best suited for eliciting the full beauty and meaning of architecture; nor is the sadness and gloom of the day's decline in harmony with the genius of every work of art. Above all, the painter must be specially educated in the relation of the several parts of the structure to the whole, and in suggesting, at least, the leading characteristics which differentiate its abounding wealth and variety of enrichment.

Of late years our painters have not concerned themselves with architecture as a speciality. Each one may take it up from time to time in a casual way, but it will not yield its best results to merely casual treatment. Its grand and wide possibilities are matters for the study of a lifetime, and even then the study, to be successful, must be systematic and thorough. It may be long before we meet with a painter such as David Roberts, who, with the most enchanting simplicity of means, was able to suggest with perfect accuracy the

utmost intricacy and variety of architectural detail,—who never lost the true character of the parts in striving for breadth, and whose most patient elaboration of details never interfered with the effectiveness of his work as a whole.

We have been led to venture upon these remarks by a visit to a collection of nearly forty paintings and drawings of architectural subjects at Messrs. Dowdswell's gallery in Bond-street,—all the work of Mr. Wyke Bayliss, a painter who has identified himself with works of this character, and who is, moreover, well known as a thoughtful and singularly attractive writer on art.

It is gratifying to find an artist of Mr. Bayliss's powers devoting his energies to the delineation of a class of subjects which are fast passing away. He is above all things a poet,—and nothing passes under his pencil that he does not invest with something of poetic glamour. He is persistently and determinedly anxious to evoke the genius of each spot, to enliven his scenes with appropriate incident, and to insist upon the peculiar and special beauty and impressiveness of each subject.

And yet we are reluctantly compelled to say that he is only partially successful. This is a qualification which might, perhaps, be added of all human effort. But in these elaborate and ambitious works there are distinct points of weakness, and shortcomings which are not mere matters of opinion or sentiment, but which can be measured or weighed. The results attained will, we fear, please neither the architect nor the painter, and will only please the public so far as they are ignorant of both architecture and painting. The former will look in vain for the true characteristics of much of the architecture portrayed, and the latter will note the absence of texture and the loose scattered effects which in almost every case mar the work as an artistic composition. The aërial tones which lend such a charm to cathedral interiors are but imperfectly rendered at the best, and sometimes are not attempted at all, or the attempt is defeated in the effort to delineate an impossible amount of minute accessory detail. The water-colour drawings are unsubstantial and "papery," and the oil pictures are too suggestive of mere paint. The interior of the Sainte Chapelle is a case in point. The universal colouring which covers every inch of wall-space is wrought to the highest pitch of brilliancy, and the recurring ornamental features made out with provoking iteration, until the resources of the palette are exhausted, and there is no force left for the transparent brilliancy of the stained glass, which, as here represented, is not glass at all.

In the interior of Chartres the artist has been much more happy, and has succeeded in bringing out the "crimson splendour" which shines through the great rose-window,—

> "When the day hath waned,
> And the great orb goes down in calm repose."

Judging from a comparison of several treatments of the same subject, we should infer that Mr. Bayliss idealises his subjects a little freely,—that, perhaps, his pictures are painted from comparatively slight sketches, and that the absence of certain truths of texture and detail, and of the effects of light and space, and the due relation and relief of the objects delineated, may be thus accounted for. Without pretending to any personal knowledge of Mr. Bayliss's course of study, we should be inclined to doubt whether he ever drew the details of Gothic architecture at all as Mr. Ruskin, for instance, has drawn them. The capitals of the choir shafts in No. 11, and the carving in No. 2, and similar portions of other examples, suggest a want of acquaintance with the distinctive peculiarities of a most characteristic phase of Gothic sculpture.

It is, perhaps, not too much to say that all the figures, as now treated, would be better out of the way. They are not well drawn. They are, in some instances, fatally over-elaborated, and though appropriate enough in general *motif*, they injure rather than improve the composition. The little boy-choristers in the Westminster Abbey picture may be excepted from this criticism; but this picture, as a whole,—one of the three English examples included in the series,—is anything but a successful rendering of our incomparable abbey.

Mr. Bayliss writes about architecture eloquently, enthusiastically, with the ardour of a true poet, and we have no difficulty in crediting him with the possession of a sincere devotion to the art which we love best. He has bestowed infinite pains in the endeavour to transfer his vivid impressions to canvas, and has thus earned our gratitude; but his imagination outstrips his hand.

Strange to say, he is most nearly successful in his most ambitious works, and in the large interior of St. Mark's he is to be sincerely congratulated. But there is much to be done before he can claim to have given full effect to the art which has enlisted his admiration.

THE BUILDING TRADE IN PARIS.

IF there is an admission which in every-day conversation is generally conceded it is that "surely a man may be considered to know his own business," a remark, it may be noticed, which will very frequently be supposed to meet the objections raised on some point by any one who may be regarded in the light of an "outsider." Now, apart from that thoroughly-acknowledged maxim that lookers-on contrive to see more of a game than those playing, can it be denied that it is a very constant occurrence for men of business to singularly err in their calculations? And their errors, let it be observed, only too commonly arise from an over-readiness to secure what appear to be sure profits. Such miscalculations are more frequent in the present day than formerly from this very reason, that the desire for large returns is more marked than in the past. Had but the voice of the despised outsider been more often attended to, many of the crises and crashes of late years might, probably, have been avoided. Approaching the subject as the outsider does, with a degree of judicial calm and impartiality scarcely possible to those directly interested, his observations, unheeded at the moment, prove only too often correct when the hour of crisis has come.

There are probably few cases in which an over-rash haste and miscalculation have led of late years to more fatal results than in that of the building trade, and the same acute crises have followed infallibly not only in England, but in France, in Germany, in Austria, and even across the Atlantic. A too eager haste in calculating on supposititious bases the promised returns, an absence of that stolid and unenthusiastic calm on which men of business so largely pride themselves, have, in an almost unaccountable manner, turned the heads of the gravest, and everywhere with the same lamentable results, from which it is sincerely to be hoped some lesson will be taken for the immediate future. Readers of the *Builder* have been made aware of the consequences, in their effect upon the building trade, which have attended, in aristocratic Germany and Austria, the wild speculation which followed on the golden years succeeding the Franco-Prussian war; in Republican France something of the same spirit has roused the speculative demon among capitalists and investors, and already, as will have been gathered from an article in our last week's number, the fatal results of an over-eager haste are making themselves severely felt, and are clearly apparent to the stranger who may at the present moment pay a visit to the banks of the Seine. Whole neighbourhoods erected in the more favourite portions of the capital, such as the newly-erected Quartier Marbœuf, and the slightly more settled Quartier Monceau, remain, in spite of their attractiveness and general splendour, but scantily tenanted, not perhaps so lugubriously deserted as some of the similar creations to be met with in the outskirts of Berlin, of Vienna, and other large German and Austrian cities, but with the significant white and yellow placards of "To Let" staring in every direction, to tell their tale to the passer-by.

Now, may not this far from satisfactory position be directly traced to a singular absence of that knowledge of their own affairs with which it is asserted men of business should at least be fully credited? A too hasty calculation has been made by the speculators on the increase, not perhaps so much of the Parisian population as on their ability to pay high rents. Had but a calm unbiassed inquiry been made into the nature of the recent increase in the number of inhabitants of the French capital, the speculations of the last few years would not have been so wildly conducted, and a large number of workmen would not now be thrown out of employ. It is advisedly we speak of "wild" speculation, for such has been the nature of the building mania on the banks of the Seine within some five or six years. Up till the year before last, never, even in the busy days of the Second Empire, have the building operations in Paris been so extensive, as is amply proved by the statistics of the *octroi* or town dues paid on the building materials which enter the capital, and which from 1879, when they stood at some twelve millions of francs,—hard on half a million sterling,—have steadily year by year increased till 1882, when they stood at the enormous total of over nineteen millions of francs, — some 760,000*l.*, the corresponding figures for 1869, the busiest year of the late Empire, having only been fourteen millions of francs,—some 560,000*l.*

These statistics, showing merely the town dues paid on the materials brought into the city, prove the feverish activity of the building trade within the last few years. Demolition has been universal; whole neighbourhoods have disappeared to make place for huge blocks of handsome five and six story stone-built *maisons de rapport*, divided into numerous *appartements*, or, as we term them, "flats"; for the number of *petits hôtels*, as the private houses are termed occupied by one person or family as in England, are comparatively few.

After a period of unexampled prosperity, in which the State and the municipality have done everything in their power to aid the speculators, the inevitable reaction has set in, but from causes against the disastrous effects of which a reasonable amount of calculation might have largely protected the chief sufferers. In almost every case the speculators, to whom the French metropolis owes the erection of the enormous number of dwellings intended to accommodate the expected increase of population, have made the singularly incorrect calculation that the tenants would be able to pay very much higher rents than have hitherto been usual in thrifty France, where large house-rents are not nearly so common as in our country. The calculations upon the increase of population were correct enough,—in the five years between 1876 and 1881, amounting to 60,000 additional persons,*—but the calculations upon the income and means of these immigrants were made upon a wrong basis. Apartments at from 80*l.* to 600*l.* rents were not wanted, or rather not so large a number of them, but any number of dwellings at 40*l.* and under. As a consequence, there has been a growing demand for such apartments, and a proportionate rise in their value. Had but the over-greedy speculators,—men who must be supposed, of course, to know their own business,—consulted the annual tables of statistics prepared by the municipality, they would have discovered that considerably over half a million of the two millions of people in Paris live in apartments for which they pay a rent of less than 1,000 francs (40*l.*), while barely a tenth of that number are able to pay more than 40*l.*† As for the question of supplying houses for the working classes, that would appear to have been almost entirely neglected on the banks of the Seine. The houses originally thus occupied have been demolished, and their place taken by huge blocks professedly intended for

* The French census, it may be mentioned, is taken every five years, not, as with us, every ten years.

† These statistics have been made all the more familiar to the public, as a recent municipal law is about to base the rates proportionally upon the rental of the rate-payers.

a class of tenants able to pay far higher rents than any workman and his family can afford.

And hence, from a miscalculation on the part of men of business,—men who might surely be expected to know their own affairs,—a most important branch of industry is in a languishing condition, and with it a whole host of kindred trades, at a moment too when they are already suffering from the effects of foreign competition. In one important direction, as we briefly indicated last week, Norway and Germany have been sadly interfering with the French timber trade, as they have, indeed, with our own. An apparently inexhaustible supply of raw material, aided by the most modern application of machinery worked by cheap labour, has enabled Germany and Norway to supply France, as it does England, with ready-made doors and windows at a price which utterly beats down all possibility of competition on the part of those not provided with the most modern machinery, a large supply of raw material and cheap labour—all features the absence of which places the Parisian carpenters and joiners, skilful though they are, at a sad disadvantage in comparison not only with their Scandinavian and German competitors, but even with their brethren in the provinces. The purchaser will inevitably go to the cheapest market, and there has been no deficiency in the supply of what with the building activity of late years has been largely in request.

In the meantime, work continues feebly. Fortunately, neither the mania nor the crisis has led in Paris to any of that scamped work which in our country is too often observable. The houses erected are, indeed, adornments to a city which, in spite of certain critics, it is impossible for those familiar with its features to find "plain." So good, indeed, is the work, that merely on this score criticism is disarmed. But the chief difficulty remains. Who are to occupy all these handsome apartments which have been so lavishly built within the last ten years? Who at least are to occupy these apartments at the rents now being demanded? One hears it said that the Americans are beginning to like London, after all, quite as well as Paris, and it really seems as if it were only the Americans,—the Americans of modern fabulous renown,—who could pay such rents as are the rule in the more favourite neighbourhoods of Paris. To meet this difficulty we hear that already many landlords have been making arrangements to lessen the magnificence of their apartments, and at the same time lower the rents. This step may, perhaps, if more widely followed, be successful. In such a case as the chief objection of high rents being reduced, it is satisfactory to think that, whoever may be the tenants of these newly-erected houses, they will have every reason to feel satisfied with their homes. In this respect they will, we suspect, be a little more fortunate than their English fellow-sufferers, saddled with burdensome leases for houses which give but small satisfaction, unable to obtain lengthy leases for houses found comfortable, still further annoyed by being prevented, by reasons of common sense, from carrying out improvements for which no compensation will be allowed. Is it wonderful that under such conditions, people in England, especially in London, are beginning to spend more and more of their time in the country and abroad away from the sunless fogs and the smoke, away from the expenses of a house in town and its social accompaniments, —too often social mortifications,—and away, in fact, from the vexations of house-keeping generally?

Let, therefore, a warning be taken in time by our speculators in house property; let them, if they wish to be men of business who really know their own affairs, read the signs of the times, and not madly build whole neighbourhoods of houses for a class of tenants who exist only in imagination; let them, to use a familiar expression, see which way the wind is blowing, and before they are led into the error of their brethren in Paris,—and, for the matter of that, on the Continent generally,— let them think twice before they rush wildly into the kind of speculation which has already more than once, from want of cool calculation, landed us in our country in the ditch.

NOTES.

THE discussion or conversation about the Wellington Statue which took place last Friday in the House of Lords afforded another curious instance of the entire inability of the majority of men even of large general culture to understand the real points of the case in regard to a question of this kind. Among eight or nine noble lords who contributed various opinions on the matter, not one seemed to have an idea as to the real reasons for the unsuitability of the statue to its former position on the arch, on which the Duke of Buccleuch actually wished to see it reinstated. Yet the reasons why the statue should never have been on the arch (quite apart from the question of its intrinsic merits) are perfectly simple and obvious, and have been repeatedly stated in these columns. The statue is out of scale with the architectural details, and dwarfs and crushes the whole erection; and it stands, or rather stood (necessarily) *across* the roadway,—otherwise, sideways on the structure, instead of frontways; "which is absurd," to adopt the Euclidean formula. It is needless to say that the *Times*' leader on the debate threw no new light on the subject, which could hardly be expected from a critic who referred to the monuments at Hyde Park and St. Paul's as parallel cases in which the Duke of Wellington had "not been well treated by sculptors:" the one case being that of a very inferior statue which spoiled the architectural design with which it was associated, the other that of a sculptured monument of remarkable power and originality, which has been placed so that it is impossible to see it. Both proceedings involve miserable artistic blunders, but of a precisely opposite character in every respect. But that is all one in a newspaper "leader," when questions of art are concerned. In politics it is necessary to have a point and an object in writing, but any twaddle may be talked about art, so long as the required space is filled up.

FROM the report of the previous day's proceedings in the House of Commons, it appears that according to an announcement made by the First Commissioner of Works, it is intended to form a committee to consider the best means of decorating and treating generally the newly-formed *place* at Hyde Park Corner. It would be interesting to know of whom the Committee is to consist, and whether there is to be any one on it who understands the effective laying out of sites, which the gentlemen of the Office of Works certainly do not. The First Commissioner observed that at present the *place* was a mere sketch which required filling in. It is merely that, and moreover it is a bad sketch, of which the leading lines ought to be redrawn before anything is gone into in detail. It is proposed to call it "Wellington Place." The objection which has been made to this, in regard to the number of streets and squares already called by that honoured name in London, should not be overlooked. "Hyde Park Corner" has become a world-wide name, but, of course, it may be replied that it is no longer a "corner." Why not call it "Apsley Place"? That would be both suitable and distinctive.

THE Society for the Protection of Ancient Buildings has addressed a note to the Bishop of St. Alban's, in reference to the threat of further restoration under the present management; a somewhat provoking letter, in which they are alternately right and wrong. They had hoped that "the commonplace character and incongruity of the new works at the west end of the nave would have opened the eyes of the bishop and other members of the restoration committee to the preposterous absurdity of the pretence that Mediæval work can be done in the present century." Of the commonplace character of the work (for our own opinion on which, see the last volume of the *Builder*, p. 172), there can be no question; but the right or wrong of the restoration question at large is not to be judged by such bungling design as that by which which Sir E. Beckett has been allowed to vulgarise a great building. Repair and reconstruction of architectural features may become necessary; it must then be carried out in the same style as the original; but this can only be adequately done by some one who is an artist as well as a constructor, and who by long study of Mediæval detail has been able to enter into, and (as far as modern hands can do so) reproduce its spirit. The Society exclaim against the proposed raising of the transept roof; but it is too late to do that now; the transept roof naturally follows the nave roof, whenever its reconstruction becomes necessary. Whether it is so or not, we do not know, not having examined it, and not being in the habit, like the Society, of expressing opinions as to what we have not seen. The announcement of the restoration of the altar-screen, under the superintendence of Sir E. Beckett, is another matter. That is purely artistic work, which he is quite incompetent to superintend. But as not one person in a hundred in English society knows good architectural detail from bad, or could even perceive that there is any difference, any lecturing on the subject is somewhat like talking about differences of colour to a blind man.

MR. FERGUSSON'S letter and plan in regard to the extension of the area available for the interment and the commemoration of great men in Westminster Abbey, which are given elsewhere in the present number, will no doubt be read with interest by many. Mr. Fergusson is probably right in thinking that a new building in proximity only (however close) to the Abbey, will not be regarded by most English people as equivalent to the Abbey as a burying-place for those whom the nation delights to honour; and he has shown his usual ingenuity in planning an addition, so as to present, in its method of access, more the appearance of being part of the Abbey than would have been the case with any of the previously suggested schemes. We must object, however, to the application of the term "transept" to his proposed addition, as its structural relations to the main building are so entirely different from those of the class of erection to which the word transept has always been applied, and the word really does not describe it. "Monumental chapel" would be its correct designation. The word "transept" may have been selected to convey an idea of the more close union of the proposed new building with the original; but this is a verbal illusion only: a glance at the plan shows that it is not a "transept." We must also express surprise that Mr. Fergusson, who has so strongly urged the incomplete character of the wooden-roofed English churches, as compared with the vaulted ones, should for one moment have suggested a wooden roof (especially such a make-believe as a wooden vault) for a building of this type. Surely in a monumental chapel, if anywhere, we should endeavour to "build for eternity," and, like the Regent, "never mind the expense."

WE must enter a protest against that part of Mr. J. D. Crace's excellent paper on decoration printed in our present issue which deals with the internal treatment of domes. Mr. Crace strongly recommends the employment of vertical lines, as in St. Peter's at Rome and the Invalides at Paris, where ribs radiating from the eye of the dome towards the base produce a number of triangular panels, which are in themselves subdivided by circles and spandrels for decoration. To treat a dome thus is to destroy all the poetry of its expression and effect, as well as to contradict its constructive principle. Mathematically, it is true, the "element" of a dome is a semicircular arch starting from any given width at the springing and narrowing (on plan) to a point at the crown, as distinguished from that of the simple arch, with voussoir of equal mass from springing to crown. But this is only a convention for the convenience of statical analysis. Architecturally, a semicircular dome is a homogeneous hemisphere, no portion of

the surface of which is constructively accentuated. The decorative treatment in vertical ribs and panels would be perfectly right for an octagonal dome such as that of Florence, but to cut up a fine hemispherical dome in that fashion, however sanctioned by precedent, is to destroy the very beauty which specially characterises the dome, the idea of mystery and infinity, and to parcel it out into measurable littlenesses.

DURING the recent gales Carew Castle, the latest and perhaps the most beautiful of the Pembrokeshire fortresses, sustained considerable damage. In more than one place the walls have been much injured, and unfortunately the proprietor lives at too great a distance to supervise the repair and safe custody of his interesting property. Mr. Butterfield has expressed an opinion that Carew might, without difficulty, be rendered habitable, and there can be little doubt that even more might be done for it than has been done for its neighbours, Manorbeer and Pembroke castles. Mr. J. R. Cobb, of Brecon, has in both of these ruins fitted up for himself a sufficient abode, and the result has been a more accurate knowledge of the parts and uses of each of these structures than can be obtained through the hasty visits of "picnicing" antiquaries. In the last two numbers of the *Archæologia Cambrensis* will be found an interesting account of Mr. Cobb's discoveries (for such they may be termed) at Pembroke Castle, and it may be well to draw attention to his remark that "the large-scale Ordnance Map is misleading in some respects; markedly so as regards the Monkton tower, the great gate tower, and the curtain between the north gate tower and the Mills postern."

THE Burlington Fine Arts Club propose to exhibit during the coming season a collection of drawings of architectural subjects by deceased British artists. The type of drawing which they especially require is that in which, while the primary aim of the draughtsman has been to represent the architectural character of a building, the subject has been regarded from the artist's rather than from the builder's point of view. They would exclude, on the one hand, "professional designs," such as plans and elevations (professional *drawings* they probably mean), and, on the other hand, landscapes in which a building, though nominally the subject of the drawing, is made subordinate to a merely pictorial treatment. Such an exhibition ought to be of great interest, but it will require a good deal of explanatory criticism to bring all its points before those of the public who are admitted to see it; and it is to be hoped that in making out a *catalogue raisonnée*, the aid of some one really learned in architecture will be secured, and that the task will not be turned over to a merely literary or archæological showman.

DR. REICHENSPERGER, an Honorary and Corresponding Member of the Institute of British Architects, has addressed to them a letter,—the major part of which is printed in the last issue of the "Proceedings,"—on the present state of architecture in Germany, from which it would seem that German architects are in pretty much the condition of bondage to shams and conventionalities from which we flatter ourselves that we have emerged. The prevailing fashion has lately been Renaissance for such buildings as pretend to anything beyond Utilitarianism; but such buildings, Dr. Reichensperger thinks, are quite below what are executed in Italy and France in the same style. The ornamentation is executed "in cement, zinc, and other makeshift materials; projections and balconies are supported on iron disguised as stone," &c. The principal adverse influence to artistic progress in German architecture seems to be the conventional taste which is practically imposed by the Legislature, and which reduces architectural style to a kind of official pattern-book, at variance with all truly original and artistic inspiration. There is, however, we are told, "room for hope"; but not, apparently, for much else.

IRON UNDER TEST AND IN CONSTRUCTION.

A SUBJECT was referred to in a recent number (see p. 178, *ante*) as having been brought before the Institution of Civil Engineers, which may prove to be of no small importance as regards structural design. We are not prepared to offer any decisive opinion as to the accuracy of the conclusions, originally published by M. J. Barba, in the Mémoires de la Société des Ingénieurs Civils, and now urged by Mr. W. Hackney, Assoc. Mem. Inst. C.E. The question which occurs to us as of cardinal value to the architect or to the engineer is, if the views now put forward are correct, what will be their influence on the theory of design, whether graphic or analytic, in all cases where iron is used in a state of tension?

The statement to which we refer is to the effect that in breaking pieces of the same quality of tough metal by direct tension very different results are obtained according to the form of the test-piece employed. Test-pieces of the same proportionate form,—that is to say, in which the proportion of length to cross-section is equal,—give, according to M. Barba, like results, whatever be their size. But test-pieces of equal length but different cross-sections, or, of like cross-sections but different lengths, give different results, measured in percentages of length stretched, varying as much as from 28 per cent. to 44 per cent. The ultimate stretching of test pieces cut from the same bar of mild steel of different proportionate lengths is thus given:—

Ratio of length to diameter.	Ultimate stretching per cent.
2·51	44·5
3·75	37·5
10·00	28·2

These proportions are given as those of round rod steel, but it is added that in the case of steel bars and plates a corresponding result is obtained.

We need not now enter into the further details brought forward in the paper. The general law indicated, or assumed, is to the effect that the tensile resistance of iron is not attributable only to the chemical or physical state of a given sample, or to the area of cross section, but that it further differs according to the proportion of cross section to length in the bar undergoing tension. The inference of the author of the paper, assuming the law to be correctly stated, is no doubt sound and good. It is to the effect that the adoption of uniform dimensions for test-pieces, in all parts of the world, is desirable. "If a uniform system of testing could be generally introduced, so that tests made by engineers in all parts of the world might be directly comparable, the advantage would be very great." With that we may all be disposed to agree. At the same time, the difficulty, it may be presumed, of establishing any such uniform rule would be formidable. Nor does it seem to us that the adoption of normal dimensions for test-pieces, if it were practicable, would be the only, or even the best, way of obtaining that further information which, if M. Barba's theory be correct, is of indispensable importance.

If proportion be so directly an element of tensile strength as is now intimated, the first thing to be done is to ascertain how, and then why, this is the case. And it is obvious that a definite statement, in all cases, of the dimensions of test-pieces, might furnish a greater variety of exact data than would be afforded by the adoption of normal dimensions. To compare one make or quality of iron with another, no doubt, the use of isometric test-pieces would afford the simplest method. But this is but a small part of the great structural question that is opened if M. Barba's views prove to be correct.

We confess to feeling a great difficulty in framing any theory, or exact conception, of the cause of what seems an unexpected anomaly. That a given metal should have a definite resisting power to tension per square inch of cross section, and that this power may differ in different samples of the metal, we all admit. That this resisting power may vary in some ratio to the size of the cross section, as, for example, that two bars of the same iron, of say 1 in. and 3 in. diameter, should have different tensile strengh per square inch of cross section, is conceivable, though we think the idea is somewhat new. It is not, for instance, in accordance with the results of Mr. Kirkaldy's experiments, which, as cited by Mr. D. K. Clark ("Manual of Rules, Tables, and Data," p. 581), gives almost exactly the same absolute strength per square inch for 1 in., 2 in. and 3 in. diameter round bars. But that in addition to this there should be a variation in the resistance of a given cross section of iron, at a given point, dependent on the length of the bar on either side of the point of strain, is very difficult to grasp. It is as to this that information is far more important than as to the particular strength of any particular brand of iron. And on this no light whatever can be thrown by the adoption of normal test-pieces; while, on the contrary, much light may be thrown by the use of test-pieces of great variety of proportions, so that all those proportions be accurately put on record.

For if a rule so strange and so complicated applies to test-pieces of iron, it must apply to all iron structurally used. Wherever a tie-bar has to be introduced in future (supposing the theory to be established), a new and very important element will be added to the cost of the designer; graphic methods will receive, at least for a time, a rude check. In fact, until the new law be not only worked out in detail, but brought within the province of direct mathematical analysis, our structural preparations must return to rule of thumb. How shall we know what tension a bar of steel will bear, for instance, in the Forth Bridge? What becomes of the experimental results obtained by Telford, by Barlow, by Fairbairn? Suppose that we take the tensile strength of Low Moor iron at its tabulated value of twenty-eight tons, and a little more, per square inch of section, that result will have been arrived at from careful trials of bars perhaps 20 ft. long. What guide will that be to us for a tie-bar of 1,000 ft. long,—if such is required? If increasing the proportion of length to diameter in a four-fold ratio be accompanied with a reduction of 33 per cent. in tensile strength, which is the outcome of the figures tabulated a few lines back, what will be the result of increasing their proportion by a hundred fold?

We are not for a moment attempting to throw discredit on the statements of M. Barba and his English commentatator. On the contrary, we hold that, if they prove to be true, they must effect some great revolution in the science of construction. Their importance, as urged by their advocates, as a means of improving the mode of testing, is but very small as compared with their influence on the theory of construction. But the more important the influence, the more needful is it to be sure of the premisses. We must have an adequate basis of fact with which to deal; and not only so,—we must have a definite philosophical hypothesis before we can satisfactorily reason from such a basis of proved facts. We are unaware at this moment how far the new theory will be accepted by mechanical men; but, in the event of such acceptance, it is certain that too prompt attention cannot be given to the effect that such a recently discovered structural principle must have on the design of all future architectural or engineering work in iron of unprecedented size or proportions.

THE VENTILATION OF THEATRES.

PARKES MUSEUM OF HYGIENE.

ON Tuesday evening last, Mr. J. P. Seddon, F.R.I.B.A., read a paper on this subject at the Parkes Museum of Hygiene, Margaret-street, Regent-street,—Mr. George Godwin, F.R.S., in the chair.

Mr. Seddon commenced his paper by strongly denouncing the "fantastic demons" in the shape of cowls and "tall-boys" which have been so largely resorted to in London and other large towns for the cure of smoky chimneys, but, as he believed, in vain. Every cowl upon every chimney was to him a standing record of woe and waste. He urged that the main remedy for smoky chimneys is the free admittance of air to the apartments in which the fireplaces are situated. Passing on to the immediate subject of his paper, he said:—

Dr. Angus Smith, in his excellent work entitled "Air and Rain," gives a tabular statement of the results of the analysis of samples of air taken from various sources, including the interior of theatres. Some of those that were experimented upon from the dress-circles were found to be actually more foul and prejudicial

to health than others that had been collected from within the very sewers in the streets!

Now how many people are there who, though enjoying dramatic representations greatly, yet seldom go to a theatre, simply because, though not particularly delicate or fastidious, they invariably suffer afterwards from the effects of the bad and heated atmosphere in them, or from colds caught in consequence of the efforts they have made to escape from it during the intervals between the several acts? The audiences in theatres have, in fact, as a rule, to imbibe such a noxious compound of the products of gas-burners and human lungs as might well convert the comedy they have gone to see into veritable tragedy. Indeed, many a case of such transformation in private life can be traced to a single night's enjoyment of a lyrical entertainment.

How comes it to pass, then, that that beneficent goddess, Minerva (who was merely a personification of what we, in our more prosaic language, call fresh air), who threw so ample a shield around her votaries in ancient Athens, fails so sadly to accomplish the like good office when invited to do so in lands which she doubtless would call "Trans-Alpine"? Is it not because in the colder North her feet are ever dogged by attendant malignant sprites, whom, if we are to call a spade a spade, we should designate as *draughts?* No sooner do we, in this climate, open a door or window to let in a breath of the divine essence, than some one shrieks an entreaty for it to be shut again, and all because those spiteful fiends have contrived to force themselves in as well. Of course, in the open-air theatres of ancient Greece, their favourite deity hovered over the assembly in no other guise than that of a good fairy godmother; but here she is followed by the evil genii, who, swift and fitful as pinching Puck, rudely intrude through the numerous chinks and crannies.

To drop metaphor, however, and speak of what we ought to be anxious to admit as *fresh air*, and of what we should desire to expel as *foul air*, why can we not induce these to make their respective entrances and exits more graciously and gracefully, as well as more efficiently? Are not they like the rest of Nature's ministers to man, once barbarian, capable of being tamed and domesticated? Why should clerks in offices find it desirable to pile up ledgers upon Tobin's tubes as soon as days get cold? Or why should ladies in the stalls of a theatre fly to their wraps as soon as the lobby doors are opened after the curtain has fallen? There is, I maintain, no great practical difficulty in the matter, except what arises from attempting half-measures only; and it has been, in my opinion, in consequence of such half-measures, that the failures made hitherto have occurred.

What is wanted is simply a plentiful supply of fresh air, forced into every part of the interior of a theatre, and not to the auditorium only, together with the extraction of the foul air from the several parts where it collects. This, then, is the problem the solution of which appears to be still waited for alike in private and public buildings, and certainly in theatres. I propose, then, to consider it specially in its relation to theatres, than which there is probably no description of building more capable of being efficiently warmed and ventilated, while yet there is certainly none other that is so generally devoid of all rational provision for health and hygienic comfort. It is obviously opposed to the interests of the manager of a theatre to have his house ill ventilated, for the very fact of its being so is a most powerful,—perhaps the most powerful,—reason that so large a number of the population avoid theatres altogether. This deterrent is infinitely more potent and active than any conscientious scruples respecting the morality of the stage, and it alienates a much larger proportion of the public. Religious disapproval does, indeed, keep away some persons from the theatre, but their number is as nothing to that of those who absent themselves solely on account of the intolerable stuffiness of the atmosphere therein, and the almost inevitable headache that follows an evening spent in the majority of theatres. On the contrary, a well-ventilated theatre means, *cæteris paribus*, a full house for most nights of the week. I have been told that a theatre at Manchester was, some years ago, notorious for the extremely defective state of the atmosphere within it for want of proper ventilation, and that it was, in consequence, very generally avoided, one lessee after another failing. But at last a manager, more enterprising and more enlightened than his predecessors, hit the right nail upon the head. He not only took the theatre, but he thoroughly ventilated it, and in a few years he retired with a handsome fortune.

To the managers of theatres, and especially those of the lyric stage, good ventilation is also a matter of special importance, because it immensely improves the acoustic qualities of buildings. That annoying echo which muddles up the notes in tantalising confusion, is instantly removed as soon as a good system of ventilation is applied to a building. A notable instance of this has recently been brought to my notice in the case of the Church of St. John the Evangelist in the Wilton-road. There, previously to its being ventilated, the preacher's words were almost undistinguishable to any but those who were in the immediate vicinity of the pulpit; but as soon as proper ventilators were fixed in the roof, the echo disappeared, and the words of the preacher became audible throughout the church from one extremity to the other.

Then it is seriously to be remembered that few buildings in the present day are wholly disconnected from the street sewers; as their drain-pipes, in spite of traps, do form a means of connexion therewith. Now, theatres being the most highly-heated buildings of any, act the most powerfully as pumps to draw up the gases and vapours underground into their interior, with what results it is easier to imagine than describe. This is another cogent reason why greater care should be given to the ventilation of theatres than even to buildings generally.

Now if it be, as I have stated, not so extremely difficult to accomplish so desirable a purpose, why have almost all the efforts in that direction been otherwise than successful? The answer to this question I believe to be, Because those efforts have been generally confined merely to the extraction of the vitiated air by means of mechanical or automatic appliances, and that, in scarcely a single instance, has there been, in addition, any intelligent effort to introduce, by the same means, a sufficient amount of fresh air, constantly flowing in, in order to take the place of the vitiated air that has been extracted, and at such a regulated temperature as to be inoffensive, by reason of the absence of cold draughts impinging upon persons situated near the inlets. In consequence of this oversight the extracting appliances, of whatever nature, whether automatic,—as "lobster-back cowls,"—or mechanical,—as revolving or fixed forms of patented extractors,—have failed to act as desired, since they have no innate force of their own, and are utterly unable to produce a vacuum. The utmost that they are able to effect, therefore, is to draw in cold fresh air from the various accidental or temporary openings, chinks around doors and windows, down chimneys, &c., so creating draughts; or to drain towards the auditorium the still fouler and more vitiated air from other wholly unventilated parts of the building. These remarks apply likewise to sun-burners, and to the great gas-chandeliers so much affected in the older theatres. These only succeed in heating and expanding the air, and expelling *pro tanto* the amount so expended. Mechanical extractors, such as fans, cylinders, pumps, &c., do indeed extract a considerable quantity of air from the auditoriums to which they are applied, and anemometers, in consequence, register thousands of cubic feet of air removed per minute, to the satisfaction of the patentees of such appliances. But, however satisfactory these results may prove to those gentlemen, they are not equally so to the unfortunate occupants of dress-circles, as the semi-exhausted condition of the atmosphere so produced there is more intolerable than a surfeit of even vitiated air would be; while to the stall-holders, blasts of the comparatively cold but far more highly vitiated air from the parts of the house behind the stage-front, for which no attempt at ventilation is ever made, sweeping over the footlights and carrying their gaseous products with them, are even more offensive.

Some persons imagine that because theatres are lofty buildings, therefore they must be airy as well as spacious; but no mistake can be more fatal, for they only form vaster receptacles of foul air, and are far less easily emptied of the same, than buildings of more moderate height would be, unless a proper system of ventilation is applied to them. Even when inlets to admit fresh air are provided for auditoriums of theatres, they are ordinarily upon an altogether insufficient scale, and being situated,—as indeed they should be in ordinary buildings, but not in a theatre,—at a level above the heads of the audience, they fail (in consequence) of producing the expected effect, because there are no exhausting outlets at a lower level to induce a circulation of the fresh air. In the rooms of other buildings the fireplace is the principal outlet for vitiated air, and is at a low level; it therefore drains off the heavy carbonic acid which falls as it cools. But in a theatre there is generally no extracting outlet fixed at so low a level, and therefore the occupants of the pit and stalls are placed as it were in a bath of carbonic acid, which rises as it accumulates, until they are forced to breathe it, to their discomfort and deadly peril.

The foregoing remarks apply principally to the auditoriums of theatres, but the importance of extending a proper system of ventilation to the entire structure must not be overlooked for an instant. The stage, the green-room, the dressing-rooms, the refreshment-rooms, the property-rooms, and all the other parts of a theatre in which the numerous *employés* are engaged, need (though they seldom receive) equal consideration in this respect. These subordinate parts in almost every theatre,—as in Covent Garden, for instance,—are in a far worse condition than those portions that are devoted to the public. The condition of the dressing-rooms, and passages and corridors leading to them, is almost invariably exceptionally frightful, for these parts of the house are numerously occupied, and have numbers of gaslights constantly burning in them, and there are seldom any or but few outlets provided for the vitiated air generated in them, and they have no inlets for the supply of fresh air. Under such circumstances how can actors perform their parts with alacrity? Languor, the precursor of disease, must sap their energy.

Yet again, the entrance lobbies, the halls, and corridors should be most plentifully supplied with fresh air, regulated in temperature, whereas, as a rule, these parts of a theatre are absolutely neglected in this respect. Were these filled with an ample supply of warmed or cooled fresh air they would become feeders for the remainder of the building, and the cold draughts now complained of in even the best ventilated theatres, which sweep into the auditorium as soon as any of its doors are opened, would be obviated.

But it may be asked, how can the whole of these multifarious parts of such a building as a theatre be sufficiently ventilated and warmed or cooled, as occasion may require? My reply is, as before,—By avoiding half measures only, which alone hitherto seem to have been attempted in this country.

The thorough principle I am laying down is but the same that is universally, on the whole, successfully adopted in America. It is only in points of detail that it would seem that the methods adopted by our trans-Atlantic cousins need some modification; such, for instance, as taking care that the warmed air is not burned, and by increasing the freshness and volume of the warm-air supply needed in winter, or by the cooled air desirable in summer.

The great essential for theatre ventilation is that the whole structure, from basement to roof, should be completely filled throughout, by mechanical means, with pure air, regulated in temperature as required. This is what is termed the *plenum* principle of ventilation. At the same time, although it is the inlets that primarily demand attention, secondary mechanical means should also be used for the constant draining off of vitiated air from the several places where it is apt to collect, such as the floors of the pit and stalls, under the galleries, upper and dress circles, over the footlights, &c. The opposite plan to the above,—that, namely, of relying mainly upon the exhausting appliances, and leaving the fresh air to enter as it can to supply the place of the air that has been extracted,—is fraught with evil, from its liability to produce draughts from the various points whence the semi-vacuum created can succeed in obtaining a supply; such, for instance, a temporarily-opened doors, and even from the chimneys, down which the smoke is often actually drawn by this abnormal demand for air. Indeed, this is one of the most frui ful causes of the smoky chimneys which cowls are supposed to remedy.

The system I have thus recommended, if fully carried out, will get over the difficulty of

having to decide whether the inlets should be vertical or oblique, a question that could only arise when they are small and few, and when the air they admit is unregulated in temperature, or whether the breezes needed should be obtained by utilising the mouths of all the Cupids, angels, and gods and goddesses that the fertile invention of the decorator of a theatre may introduce; or whether the cornucopiæ and such like gauds should be made hollow or not. Given power enough, which is easily obtainable, to flood the whole building with air tempered as required, and it will matter less as to the precise distribution of the inlets into the auditorium itself.

There is one thing that will doubtless tend to render this problem of the ventilation of theatres, which has been found so difficult, easier to accomplish than it has been. I mean the introduction of electric lighting instead of that by gas. This has already been done by the enterprising manager of the Savoy Theatre, and later by that of the Prince's Theatre,—I doubt not, to their own material advantage as well as to the comfort of their ever-crowded audiences.

We cannot afford, however, to let this present generation pass away stifled and incommoded while electricians are perfecting their methods of lighting. Nor is it every theatre that has a spare acre or two, in the middle of London, alongside of it, for the accommodaton of a puffing steam-engine to create the light, nor an untenanted Embankment as a convenient neighbour to put up with the noise of one. In the meantime the gas-lights in theatres should, as far as possible, have their products of combustion conveyed outside the building, without being allowed to mingle with and contaminate the atmosphere of the interior. Yet, notwithstanding this serious drawback of the ordinary gas-lighting to contend with, we have scientific resources at command sufficient to enable us to overcome all the difficulties that at present retard the proper development of this essential of civilisation, proper and adequate ventilation.*

THE PROPOSED "CAMPO-SANTO" AT WESTMINSTER ABBEY.

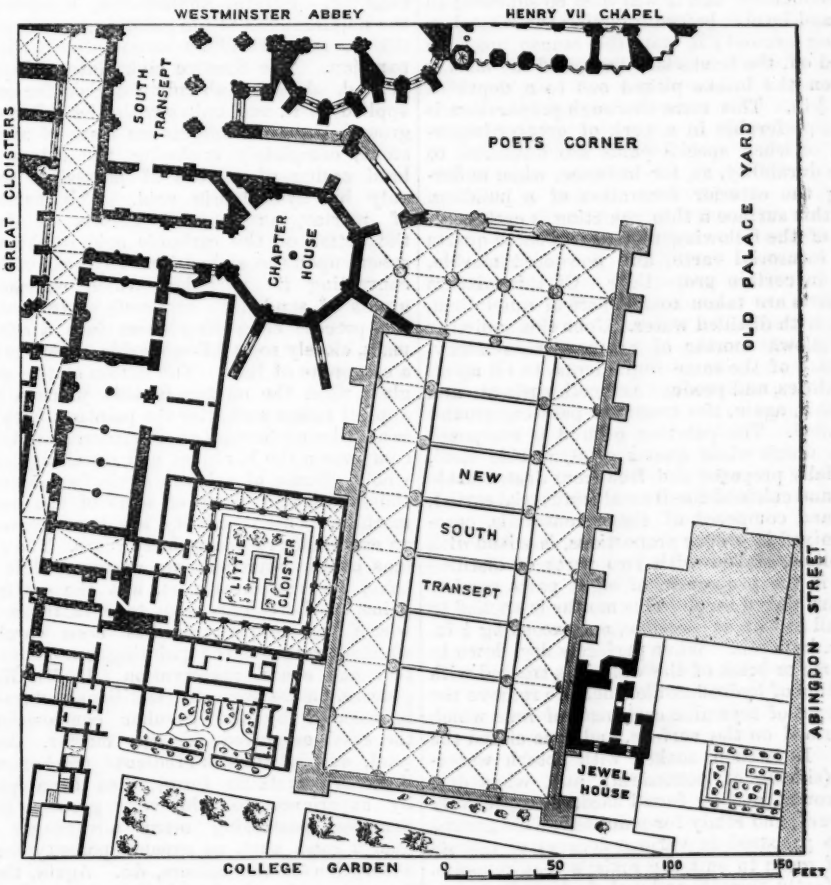
As I have never seen a drawing of the elevation of Sir Gilbert Scott's proposed "Campo-Santo" in connexion with Westminster Abbey, I am unable to form an opinion on its artistic merits; but the plan published in the *Pall Mall Gazette* of the 29th ult. is quite sufficient to enable any one to form a distinct idea of what its merits or faults may be in all essential respects.

In the first place, I have no hesitation in stating my conviction that neither Sir Gilbert Scott nor any architect that has yet lived could render a long unbroken one-storied building, extending in one line for 450 ft., worthy of such a situation. It would form one side of Old Palace-yard, 200 ft. in width, and then face the gardens at the south end of the Parliament Houses, extending 400 ft. to the river's edge. By exaggerating the height, and lavishing ornament on it, and adding towers and pinnacles, a great deal, of course, might be done to remedy these defects, but as it would have to compete with the Houses of Parliament and the Victoria Tower, this could only be effected at an expenditure of money which, I feel sure, would not, and ought not, to be sanctioned for such a purpose.

In addition, however, to the enormous outlay required to make the building worthy of such a situation, the scheme necessitates the removal of all the houses in Abingdon-street as far as Great College-street, which would involve an outlay of money which ought not to be incurred unless no other means can be devised for meeting the difficulty, which, as I hope to be able to show presently, is not the case in this instance.

The most serious objection, however, to the scheme is neither artistic nor financial, though these appear to me insuperable,—but sentimental. It is not, and never can be made, an integral part of the Abbey, nor ever seem to be in direct connexion with it. Burying in a "campo-santo" *at* Westminster can never, in public estimation, be considered an equivalent to being buried *in* the Abbey,—at least, not till after a century or two of entombments of illustrious men has sanctified the new burying-place. A cheaper and better expedient would be to construct a covered way from the north transept to a new porch to St. Margaret's Church, and for Parliament to decree that burying in that church was to be considered as equivalent to burying in the Abbey. It is nearer and more accessible than this "campo-santo," and older and every way more appropriate and more closely connected with the Abbey. But would the public ever be brought to take this view of the case, or would it ever be an object of ambition with our great men to be buried in St. Margaret's Church because there *is* no longer any room for them in the neighbouring Abbey? I think not,—not in our day, at least.

Fortunately, a solution in this case, of all these difficulties,—artistic, financial, and sentimental,—is not far to seek. It would only be necessary to pull down the houses on the west side of Old Palace Yard, and those which encumber the Abbey in Poet's Corner. Besides this, some second-class clerical residences on the site of the old Infirmary and St. Catherine's Chapel must be removed. When this is done a clear space is obtained between the little cloisters of the Abbey and the old Jewel Tower, sufficient for the erection of a building 250 ft. by 100 ft. in width, in immediate contact with the Abbey, and that may be so arranged as practically to form part of it.



Sketch Plan of Proposed Addition to Westminster Abbey.

The area of this building would be considerably in excess of that proposed by Sir Gilbert Scott, besides being in a much more compact and manageable form. It would also range perfectly parallel with the Houses of Parliament, and be situated well within the line of the east end of Henry VII.'s Chapel. It would also group most pleasingly with the Chapter-house and the Abbey itself. But its greatest merit, it seems to me, is that it can be made to appear a part of the Abbey itself.

The principal entrance to it would be by a doorway situated at the upper end of "Poets Corner," between two of the buttresses of the Chapter-house, but placed diagonally, so as to belong, in appearance, to both or either the Abbey or the new building.

When a visitor enters by it, if he turns to the right he is in the "Poet's Corner" in the south transept of the Abbey. If he turns to the left at even a less distance he is in the new building. Practically, though not mathematically, it is an extension of the south transept, and visitors to the building would pass from one to the other without perceiving the difference, except, of course, in grandeur and beauty of design, the one would remain, and be called the *old*, the other the *new* south transept, but both parts of the same Abbey are equally sacred and entitled to honour.

The new south transept would, of course, be erected in the same style as the Abbey itself,—it is not an expensive style,—with every detail copied from the parent building. It would, necessarily, be less ambitious and less ornamental. It would be very much lower, and the roof of the central aisle, at least, would be in wood. We can all judge how ornamental that can be made from the neighbouring Hall. If, however, the expense were not a bar to its being done, it would be a great advantage if the side aisles and lower vestibule were vaulted. But, whether this were done or not, it might be made much more essentially a part of the Abbey than Henry VII.'s Chapel, which, being built in a different style, is felt to be a different building, though in such immediate juxtaposition.

Though it would be very much lower than the Abbey,—its height to the ridge of the roof would be about 100 ft.,—it would be very much more spacious. The width of the nave and transepts of the Abbey is only about 80 ft., while if this building were carried out as shown in the annexed woodcut, it would present a clear space from wall to wall of at least 100 ft. It need hardly be observed that this increased spaciousness combined with diminished height would be a great gain to the effect of any monuments that might be placed within it, and to the display of sculpture on the scale that is now fashionable.

It is, of course, extremely difficult even to make a plausible guess at what a building will cost before detailed drawings are prepared; but we are probably justified in assuming that 100,000*l.* would suffice to complete the proposed building, even if carried out in the most lavish manner. If this be so, it is evident that one-fifth of that sum might be saved by reducing the width to 80 ft., the same as the Abbey. 20,000*l.*, or even 30,000*l.* beyond this might be saved by omitting all vaulting, and applying a wooden roof throughout, and by various economies, which, however, I should be very sorry to see practised. If carried out as it might be, it affords a glorious opportunity of adding worthily to one of our noblest buildings, and, if undertaken, it ought not to be in any niggard spirit, but with the lofty aspirations of the architects of former days, backed by the enormously increased wealth accumulated in the nineteenth century. JAS. FERGUSSON.

20, *Langham-place*, Feb. 12, 1884.

A Statue of Apollo, 1 mètre 80 centimètres in height, is reported to have been discovered outside the Porta San Lorenzo.

* The remainder, together with a report of the discussion which followed, in our next.

A NEW PROCESS OF MURAL PAINTING.

An interesting paper on "Mineral Painting," a new process which, it is claimed, will produce permanent and indestructible mural paintings, &c., was read before the Society of Arts, on Wednesday evening last by the Rev. J. A. Rivington. The process is the invention of Herr Adolph Keim, chemist, Munich. The paper, as read by Mr. Rivington, would occupy more space than we can spare, but we are enabled to give the following particulars of the process:—

Mr. Keim's process of mineral painting, the result of nearly twelve years most incessant and arduous labour, is based on the stereochromy of Schlotthauer & Fuchs, but differs from that in such important particulars as to constitute practically an entirely new process.

I. *As to the Preparation of the Painting Surface.*—The preparation of the surface to be painted on is a great feature in this process. Every care is taken, in the first place, that the wall to be treated contains no damp or decaying stones or bricks, and the latter must have been sufficiently baked. If the wall be already covered with stucco or mortar this will serve as the first ground, if in a thoroughly dry and sound condition, and it will then be sufficient to clean and level it before applying the second or painting ground; if not, the stucco must be cleared off, the bricks laid bare, and the mortar between the bricks picked out to a depth of about ¾ in. This more thorough preparation is always preferable in a work of greater importance, or when special pains are advisable to secure durability, as, for instance, when undertaking the exterior decoration of a building. Upon this surface a thin squirting is cast, composed of the following mortar:—Coarse quartz sand, infusorial earth, and powdered marble, mixed in certain proportions. Of this mixture four parts are taken to one part of quick-lime, slaked with distilled water. Upon this squirting cast follows mortar of ordinary consistency, composed of the same ingredients, to fill up all inequalities, and produce a smooth surface; and upon this, again, the second or painting ground is applied. The painting ground is composed of the finest white quartz sand, marble sand, artificially prepared and free from dust, marble meal, and calcined fossil meal (infusorial earth). The sand composed of these materials, carefully mixed in proper proportions, is mixed with quick-lime, slaked with two parts of distilled water in the proportion of eight parts sand to one part slaked lime. This mortar is applied to the wall as thin as possible, not exceeding ¼ in. to ½ in. in depth. When perfectly dry, down to the stone or brick of the wall, it is treated with a solution of hydrofluosilicic acid, to remove the thin crust of crystallic carbonate of lime which has formed on the surface, and thus closed the pores. It is then soaked with potash waterglass (silicate of potassium), and, when dry, the ground will be found hard, but perfectly absorbent, and ready for painting. This ground can be prepared in various degrees of coarseness of grain to suit the artist's requirements. A perfectly smooth and polished surface presents, however, greater difficulties in the subsequent process of fixation, from its absorbent qualities being necessarily less. The ground can be prepared in any tint or colour, and can be applied to any suitable substance, such as stone, tile, slate, wire gauze, canvas, &c. If applied to canvas, it can in this form be fixed to wood panels, millboard, ceilings, &c., and admits of being rolled with perfect safety.

II. *As to the Colours.*—Certain pigments only are admissible for this process, in order to ensure permanence, and these must be absolutely free from any adulteration. All those found available for stereochromy can be employed. These are, for the most part, composed of natural earths, or metals, since experience has proved that the most permanent colours are those derived from such sources. In their preparation regard has been had to the well-known law in optics which teaches that colour does not lie in the substance which appears as colour, but in the rays of light which are divided, reflected, or absorbed by the substance in such a manner as to produce the effect of colour upon the eye. Substances, therefore, which readily undergo change, whether by reason of their affinity to other substances, or by the action of light itself, which often causes molecular change, must lose their original colour, since under their altered conditions they absorb or reflect the rays of light in a different manner. It is, therefore, of primary importance that the pigments should remain chemically unaffected by the substance of the painting ground on which they are laid, as well as of the material employed for fixing them. To meet this end, the colours in this process are treated beforehand with alkaline solutions (of potash or ammonia) to anticipate any change of hue which might result from the use of the alkaline liquids which form the fixative, and are further prepared with certain admixtures, as the hydrates of alumina, magnesia, or silica, oxide of zinc, carbonate of baryta, felspar, powdered glass, &c., as required by their peculiar properties. The colours found available present a very complete scale. They are thirty-eight in number, and there are several colours which could be added if required. They consist, speaking in general terms, of four varieties of white, six of ochre, two of sienna, ten of red, two of brown umber, two of Naples yellow, two of ultramarine, five of green, three of black, and cobalt blue.

III. *As to the Fixing.*—The fixing of the painting is effected by means of a hot solution of potash waterglass, treated with carbonate of ammonia, thrown against the surface in the form of a fine spray, by means of a specially constructed machine. Several applications, according to the requirements of the painting, are necessary, till the ground will no longer absorb the preparation. The fixative sinks into the porous ground, which has already absorbed the colours applied to it, and unites with the colours and ground in one homogeneous mass of artificial stone, completely enclosing the colour in a hard casing of silicate of potassium soluble only by hydrofluoric acid. The hardening of mortar, as is well known, is due to the action of the carbonic acid in the atmosphere upon the slaked lime (hydrate of lime), converting its particles, which enclose the grains of sand, into *carbonate of lime*, and in the process cementing them into a cohesive mass, closely resembling marble, which is itself a carbonate of lime. The action of the waterglass upon the mortar in this process, when applied before and after the painting, is to form in addition a *silicate of calcium*, increasing beyond comparison the hardness and durability of the whole, silicate of calcium again forming one of the constituent parts of some of the hardest marbles. This durability has been proved by an experience of nearly forty years. The paintings by the stereochrome process, while they have, for the most part, lost the coating of paint or the colour, have, save in those cases where the preparation has been carelessly effected, retained the painting ground in perfect and sound preservation. In Mr. Keim's process, moreover, an additional durability is ensured by the peculiar composition of the sand employed for the mortar. Marble sand, one of the ingredients (carbonate of lime in crystallic form), has been proved by experience to add very greatly to its firmness, possessing many advantages over quartz sand, such as greater porosity for the absorption of the colours, &c. Again, the infusorial earth mixed with it (a form of silica) has a double effect in consolidating the mass. 1. It acts mechanically, cementing and binding together, with the lime, the coarser particles. 2. It forms, to some extent, with the lime a silicate of calcium, such as afterwards results from the addition of the water-glass. The presence of this silicate within the mortar adds very greatly to its hardness and power of resistance to chemical or mechanical influences.

IV. *As to the Painting.*—The process above described, so far from resembling other methods of fresco-painting in the technical difficulties they present to the artist, is far easier and pleasanter to work in than even ordinary oil or water-colour. Every variety of treatment is possible, and the method presents equal facility for transparent glazing, or for painting in body colour. Distilled water is the only medium used in painting, and the colours go a long way, as they can be used very thin; in fact, the thinner the coat of painting the better it will fix, and there need be no waste of paint at the end of the day's work, as in oils. If the remainder of the colours on the palette be kept moist with distilled water they will be perfectly available for the next occasion. Retouching and correction are effected with the greatest ease, nor do the most delicate shades of light colours, when laid over dark tones, *in the least degree* alter their tone or darken over them, as in oils. In these respects, therefore, the system presents decided advantages, both in cleanliness, simplicity, and economy.

The finished painting will admit of sulphuric, acetic, or any other acid save hydrofluoric, being poured on it, even in an undiluted form, with absolute impunity. Caustic potash also has no injurious effect upon it. It may be suffered to lie in cold or hot water, and may be scrubbed with a brush and soap. If scratched with the finger-nail, the only result will be damage to the nail. It will therefore safely defy any friction from passers by, &c., where applied to the wall of a building. If damaged by a violent blow from a hard instrument it can be repaired and retouched with the greatest ease and simplicity. The carbonic acid of the atmosphere is distinctly beneficial to it, as imparting to it, by degrees, the consistency of actual marble, when absorbed by the lime in its composition. The moisture of the atmosphere, even in the form of heavy rain, is also an advantage in dissolving away the free carbonate of potash formed by the chemical action of the water-glass. For *interior* decorations it is in any case an advantage, though not a necessity, to wash this off with distilled or filtered rain-water. In the case of *exteriors* this may be left to the natural action of the elements.

If the foregoing statements be correct it becomes obvious that paintings executed by this process admit of being cleaned, when necessary, with water, soap, or caustic potash, without incurring the slightest injury to the most delicate colours,—a fact invaluable in a climate such as that of London.

Although the process has been devised primarily to meet the requirements of mural painting, it is capable of application to other purposes. Owing to its durable qualities and the readiness with which it can be cleaned, it is well adapted for scene-painting, especially as it is uninflammable, owing to the presence of the silicate. For ordinary house-painting it is claimed that it would last as long as the building itself, only needing to be scrubbed down from time to time. Its use for this purpose would be additionally valuable owing to the fact that it is damp-proof.

A PRACTICAL OUTCOME AS TO ELECTRIC LIGHTING.

The brilliant expectations that were, some short time back, entertained as to the electric light have been succeeded by almost a panic. The second movement is as unreasonable as was the first. The original fear that the property of gasworks would be depreciated, if not destroyed, by the new invention is now entirely dissipated. It is evident that there is room for both illuminants; and that each has its appropriate sphere of utility. What the electric light enterprises are now suffering from is the undue expectations with which they were started, and the heavy loads with which the various associations were handicapped in the way of payment for patent right and promoters' charges. As the market rights itself in this respect, we may expect to see electric companies taking a steady, if a modest, position among the industrial associations of the day.

The public are indebted to Mr. Octavius Coope, M.P., for detailed information as to the cost of a special form of electric lighting, which is a valuable contribution to our exact knowledge of the subject. This information has the special value of being supplied by a gentleman who is neither directly nor indirectly interested in or connected with any electric light company or electrical system whatever, nor does he hold a single gas share. Freedom from any bias, whether conscious or unconscious, is a characteristic as valuable as it is unusual. The experience detailed is that of a year of working; and it does not appear as if any of those considerations which sometimes affect the results of a first year's experience, so as to make it exhibit unduly favourable results, had been overlooked in the present instance.

We must not occupy our space with reproducing the details given in Mr. Coope's letter of the 24th ultimo to the *Times*. To abstract them would be of very imperfect utility, as there is nothing set down which is not of importance to any one who intends to make practical use of the experience. But the general outcome is this. Berechurch Hall, Mr. Coope's residence, has been illuminated by 200 Swan incandescent lamps, of a nominal power of 18 candles each, which have turned out to be of a photometric

value of 20 candles each. The cost of the first instalment has been 1,490*l.* 8s., or 7·45*l.* per lamp, against an estimated cost of 1,333*l.* 18s. for gas, presumably of the lower photometric value. A 12-h.-p. steam engine and four Burgin dynamos are provided in this sum, and the annual cost for 1883, allowing 10 per cent. depreciation on cost of machinery and 5 per cent. on conductors, has been 359*l.* 18s. 9d. The working hours, which were estimated at 1,150 in the year, have been actually 1,823; the result being a little less than a farthing per hour for each 20-candle power lamp.

Mr. Coope does not give the corresponding cost of gas; but he states that of small coal at 13s. 6d. and of coke at 18s. per ton,—Berechurch Hall, being about four miles from Colchester station. He also obtains duty from his engine, in the way of pumping, which he estimates to be worth 60*l.* per year. The softness and purity of the light, the absence of heat, and the avoidance of that contamination of the atmosphere which makes it impossible to keep plants in a room lighted by gas, are spoken of with great satisfaction.

It will be observed that the circumstances of the case are special. An isolated house, requiring the large number of 200 lamps, is a unit of sufficient size to pay for the constant services of an engine-driver and a lad. There are no conflicting requirements. There is, probably, a great uniformity in the demand for light. It would be misleading to expect the same return in cases where these features were absent. We may add that the fuel cost 25 per cent. of the total cost. If equal quantities of coke and small coal were burned, the average cost per ton would have been 15·9. We give this calculation as affording a guide as to the allowance to be made for a higher or lower price of coal in any otherwise corresponding circumstances.

EDINBURGH ARCHITECTURAL ASSOCIATION.

THE visiting season was opened on Saturday last by an excursion to the Canongate, in which apout seventy members took part, under the guidance of Mr. John McLachlan, past-president. The excursionists were received in the Hall of the Canongate Tolbooth, by Mr. Skinner, Town Clerk, and by Mr. Robert Morham, City Superintendent. The latter gentleman read a few notes, in the course of which he said that the building was one of the best examples of the pure Scottish Baronial style, and was erected during the reign of James VI. in 1591, as a species of Town House or seat for the local Government of the Burgh of Canongate. The various alterations which the structure had undergone were detailed, and its present uses as a Register Office and Police Station were explained. After a close inspection of the interior and exterior, Professor Baldwin Brown proposed a vote of thanks to Mr. Morham for his party. The party thereafter proceeded to Moray House, where Mr. Maurice Paterson, the rector, met them, and exhibited prints of the house as originally executed and laid out. Mr. Andrew Kerr, late of Her Majesty's Office of Works, made a few remarks, in which he drew attention to the striking contrast between this building, erected in 1628 by Mary, Countess of Home, and the one just left. Seeing that the one building was erected as a prison and the other as a first-class residence, he made no comparison, but drew attention to the harmonious blending of Baronial, Gothic, and Italian, the entire absence of defensive arrangements, and the dissimilarity between it and other buildings erected in Edinburgh about the same period, which he explained by the fact of its founder being an Englishwoman in possession of considerable wealth, which enabled her to provide a comfortable residence in accordance with the ideas of the South. The interior is plain, except in the two principal rooms, where the ceilings are domed and panelled, the latter of which are filled in with beautifully-designed plaster ornament, significant of much artistic power judiciously employed. It appears that the grounds, as originally laid out, were terraced, and contained a pleasure-house, in which, it is said, the Treaty of Union was commenced to be signed. After detailing the illustrious tenants of the house, the speaker concluded by pointing out that in more modern times the building was used as the Hall of the British Linen Banking Company, later as its counting-house, still later as a private residence, and it is now used as the Training School of the Free Church of Scotland. Mr. T. Croall having proposed a vote of thanks, a departure was made for Milton House, and subsequently to Queensberry House, regarding which Mr. John McLachlan read some notes, in which he enumerated the various occupants of the pile, and explained the several alterations which had been made on the building. After examining a few of the surrounding closes in a cursory manner, the proceedings terminated by an inspection of the curious house or lodge situated at the west corner of Holyrood Palace, known as Queen Mary's Bath, the history of which was explained by Mr. Kerr.

ARCHITECTURAL ASSOCIATION.

VISIT TO MANSIONS IN HARRINGTON GARDENS, S.W.

THE second Saturday afternoon visit by the members of this Association to works in progress took place on the 9th inst. to some new mansions in Harrington-gardens, South Kensington. The mansions are situated in a good, broad thoroughfare, but the "gardens," properly so-called, are to the rear, the usual divisions, or "garden walls," being dispensed with. The houses inspected were a pair of mansions in course of completion from designs by Messrs. Ernest George & Peto, architects, and which present a very quaint appearance, the outline being bold and picturesque, having two large gables, one being relieved by corbie steps. Unfortunately, no one was in attendance to meet the members, excepting a watchman, who could give no information, so they had to wander through the various rooms and apartments, and find out their uses as best they could. A foreman with a set of plans was much needed; if one had been provided, as on the occasion of the former visits to the City, it would have saved much trouble and questioning on the part of the members. The houses visited are being executed by Messrs. Peto Brothers, builders, of London. Two adjoining houses, erected from designs by the same architects, and occupied by Mr. W. S. Gilbert and the Hon. H. Coke, were built by Messrs. Stephens & Bastow, of Bristol.

THE WATER SUPPLY OF PARIS.

WE take the following statistics of the water supply of Paris from the *Journal des Débats*. The author of the article from which we quote is of opinion that the quantity of the daily supply for domestic use is inadequate, whilst an excessive quantity is wasted in watering streets, and for other public purposes. In 1877 the total daily supply per head was 185 litres (40 gallons); at present it is only 164 litres (36 gallons), and it will rise again to 180 litres (39 gallons) per head only after the completion of the new works now in course of erection, for a present population of 2,230,908 inhabitants. The following is the daily withdrawal of water from the existing sources of supply:—

	Cubic mètres.
Vanne	100,000
Dhuis	21,000
Arcueil	2,000
Ourcq	125,000
Seine	60,000
Marne	54,000
Artesian well	7,000
	369,000
	(81,215,424 gallons.)

Of this quantity, at least 75 per cent. is used for public purposes, and only 25 per cent. is supplied to private houses, in the following proportions, approximately:—

	Cubic mètres.
For flushing sewers	139,000
For watering streets and squares	65,000
For the supply of private houses	95,000
,, ,, public works	23,000
,, ,, drinking-fountains	9,000
Waste	38,000
	369,000

From this statement it follows that the quantity used for public purposes is 120 litres (26 gallons), and for private consumption only 42 litres (2 gallons), per day per head. Moreover, it is stated that the best water is not exclusively supplied to the private consumer. At least 125,000 cubic mètres (27,512,000 gallons) of excellent drinking-water, or 55 litres (12 gallons) per head, are supplied daily, but mostly used for public purposes, whilst the great majority of the inhabitants of Paris are furnished with the more or less polluted water of the Ourcq Canal or through the pumping station at Chaillot with Seine water.

EGYPTIAN ARCHITECTURE.

[WITH ILLUSTRATIONS.]

THIS was the subject of a lecture given by Mr. Reginald Stuart Poole, LL.D., on the evening of the 7th inst., at the Royal Academy. Egyptian architecture, he observed, is Egyptian art, for sculpture and painting are, as a rule, combined with architecture and subservient to it, there being some rare exceptions in the case of sculpture only. He went on to speak of the physical and moral causes of Egyptian architecture, namely, the suggestions offered by the colours and forms of nature, the materials at hand, and the religious ideas which the ancient artists strove to express. The colour of Egypt is full of strong contrasts, harmonised by the most vivid sunshine, a sunshine which softens whatever falls under its light, and reflects on objects in shadow the most delicate varieties of colour. (This truth was illustrated by some beautiful Egyptian studies lent to Mr. Poole by Sir Frederick Leighton). The effect of this luminosity on the minds of early artists would be to induce them to have no fear of strong contrasts of colour for external decoration; and for internal decoration, where the heat of the climate would render comparative obscurity necessary, the same system would still better apply. While the colouring of Egypt has a powerful charm, the forms of the landscape are extremely simple. The Nile has cut a trench through the tableland of the desert, a trench bounded by clifflike mountains at a distance from the river on both sides rarely exceeding eight miles, and sometimes at the water edge. The long lines of the desert tableland occasionally ending in steep sloping sides (as seen in one of Sir Frederick's studies), and with their cliffs slanting to the valley at the same angle, are suggestive at once of the long horizontal roofs of the temples, and the broad portals with sloping sides which face them; while the colonnades of palms with tufted heads, seen in the background with a mountain behind them, are naturally suggestive of the porticos of the temples. The dryness of the climate and the abundance of building material would encourage a monumental instinct. Limestone, sandstone, and red granite can be quarried from the mountains close to the Nile in Upper Egypt, and the blocks can be transported on the waterway throughout the valley of Upper Egypt, and by many streams to any part of the triangular plain of Lower Egypt. The beautiful Nile deposit makes excellent bricks, which, in most parts of the country, need only to be sun-dried. Timber is extremely scarce, but must, in very early times, have been far more common, for the earliest stonework is imitation of woodwork, and in woodwork the Egyptian native craftsmen have always excelled. We should therefore expect an abundant use of stone and brick, and a far smaller use of wood in the Egyptian buildings.

The Egyptians, who 6,000 years ago reached what some think the highest point of their civilisation, used the materials and suggestions of nature according to their instincts, directed by a religious motive. In studying their architecture, it is impossible to pass by their social qualities. They had not only a keen love of nature and open-air life, the sports of the desert, the marshes, and the water, but, yet more, a love of country, and delight in home. Egyptian domestic life was without the constraints which have almost everywhere else retarded Oriental civilisation. Women enjoyed absolute freedom, legally as well as socially; and all those to us novel rights and privileges which have been viewed with alarm and jealousy were fully enjoyed by establishing a balance of power, and may be held to have preserved Egyptian civilisation for as many centuries as other civilisations can count decades. These conditions had something to do with the monumental instinct; for, as we shall see, the first idea of historical record was the perpetuity of the house, and the centre of religious service was always the tomb. But it was the belief of the Egyptians which took hold of the family instinct. Their religion in its higher aspect was simply sun-worship. One form of the solar myth they applied to life. The god Osiris, who represents at once the sun of the night and the Nile, or light and fertility, wages

a long conflict with his brother Typhon,—darkness, the desert, and the storm. At length he is vanquished by his adversary, and disappears in the west, mourned by his sisters Isis, the dawn, and Nephthys, the after-glow. But his death is not annihilation. He reappears as his child, the young Horus, seated upon the lotus, which still on the canals of Lower Egypt opens its blue petals to the rising sun. The conflict with darkness is resumed; and the reign of light is established. This is a type of the picture of every day, and the story of every year. It is equally a type of man's existence, its early brightness, the unequal struggle with evil, seeming defeat, but final victory,—or their spiritual aspects,—life, death, and resurrection. The Egyptians believed that Osiris became above all things ruler of the shades, and that at his burial-place, Abydos, the souls of men passed in the wake of his boat through an opening in the western mountain to the hidden land, God's Under World; that there they took the form and name of Osiris, their judge, and were by him rewarded and punished according to their deeds done on earth (see illustration). Thence the good, after a long probation and purification, returned to the source of light, and the wicked, after terrible punishment, disappeared in annihilation. While the Egyptians held this firm belief in the life of the soul after death, they retained the older conception that the tomb was the house in which the dead man's shade still continued his life on earth, surrounded by the food and drink, clothes and furniture, of his earthly house, or, at least, by their representations. But it must be observed that the shade is never confused with the soul, any more than the ghost is in modern notions. The tomb thus became what the Egyptians called "the Eternal House," while the home on earth was merely a hostelry; so the necessity of the case made the tomb a type of immortality. In order to ensure its permanence, the body of the inhabitant was carefully preserved as a mummy by a process naturally suggested by the dryness of the climate; while the estates were rented for the annual offerings made at certain seasons to secure the repose of the soul. Thus it was the interest of the family to preserve the body as title-deeds, the interest of the priests, who benefited by the offerings, to keep the estates in the family.

The origin of the tomb is clearly to be traced to the earliest house. The external and internal decorations are traceable to the wood-panelling, and the wooden doors and windows of the type. One of the oldest tombs is actually wainscoted with wooden carvings. But the architectural forms are dependent on the principle of permanence to which stone naturally lent itself. The external shape of the oldest tomb is an oblong platform, with slightly sloping sides, formed by receding stones, not cut; so that had it not been flat-topped it would have had two gables (see Example D on illustration). The dimensions vary from a base of 160 ft. by about half that size, to one fifth and fourth of these measures, with a height of about 30 ft. to 13 ft. In the entrance, and also the interior, columns were sparingly used: they were always absolutely square, without base or capital. The tomb had three parts,—the chapel, the secret chamber, and the sepulchral chamber (Examples A, B, C). The entrance was usually on the east side. If on the north it was within a portico, supported by two columns (see Examples D). It was almost always without a door, that all might come and go without hindrance. It led to the chapel, of which the only necessary adornment was the funeral tablet, praying for the performance of the due rites for the passage of the soul to the Under World, "the ancient, the vast, the perfect"; and for the performance of the offerings in future times. In later days those who passed by, whether men or women, are begged, as "you love life and hate death," to repeat the last portion of the prayer. Also, later, the sepulchral inscription was sometimes enlarged into a memoir of the deceased, his services to the king, and his good deeds to his people, how he relieved the fatherless and the widow, fed the hungry and clothed the naked, and made no difference between the small and the great. The walls are usually covered with painted sculptures, in a series of parallel friezes. Here the three-fold purpose of the inscription is maintained. They represent the labourers, herdsmen, sportsmen, fishermen, and craftsmen, all working for the great end and purpose of the tomb, the preparation of the funeral feast, or the furniture of the eternal abode. The only actual allusion to the funeral itself, or perhaps to the future life, is in the representation of great boats, in which the deceased, as a living person, makes his last journey. The estates personified bring their offerings, each being rated for a particular product,—wine, milk, &c. A funeral procession of a later period shows the extraordinary completeness of the furniture of the tomb and the splendour of the pageant. The tone and character of the sculptures is extremely conventional, without perspective, without relative proportion, dignity being conveyed by size. The human figure is absolutely conventional; the animals, however, are better portrayed. The colouring is very primitive,—red, blue, yellow, green, black, and white, with brown for animals, being alone used, and the ground left white. It is, of course, impossible to speak with any sort of enthusiasm of this very simple treatment of colour, which we do not find modified in later times except by the use of delicate neutral grounds, and, apparently, at a very late period, by lowering the tone. It must be recollected that we have reason to think that the Egyptian colours are the best representations they could produce of precious substances, certainly gold and lapis lazuli, probably silver, ivory, and ebony, and also red and green jasper. If we translate the coloured patterns into these materials we shall modify our opinion of Egyptian taste. The ceilings are painted with graceful designs, usually geometrical. The same is the case with the panelling of the doors and tablets.

By the side of the chapel is a hidden chamber in the solid masonry, the corridor communicating with the chapel by air-holes, and similarly ventilated outside (see Example C). In this place were several statues of the deceased, that his shade might choose the one he liked best, or that one of them might survive disaster. In these the shade resided. The incense, or smell of the offerings, passed through the air-holes into his secret chamber. In the tomb of Ti, at Sakkara, we see representations of incense being offered by figures carved at the entrances to the air-holes. The secreted figures afford the best examples of Egyptian art. They, and they alone, are unquestionable portraits, showing a promise which was never fulfilled; for, as the belief in the shade disappeared, and his secret chamber was abandoned, his statue being placed as an architectural adornment to the chapel, the motive for portraiture absolutely perished, and with it the great hope and promise of excellence in Egyptian sculpture.

The third portion of the tomb, the sepulchral chamber, is wholly disconnected from the rest. It is approached by a pit, of which the mouth is in the roof of the tomb, and which leads directly downwards through the solid masonry into the rock beneath, where, in the level below the chapel it enters a horizontal passage leading to the sepulchral chamber, which is also excavated in the rock (see Examples A, B). This chamber is plain, or slightly decorated with inscriptions from a funeral ritual. In the centre stood the mummy, in its triple case, the two wooden coffins and the outer sarcophagus of stone. Some religious symbols, food, and drink, were placed here; then the passage was closed, and the mummy-pit filled with stones and sand to the mouth. Notwithstanding all these precautions, no tomb of the hundreds explored in Memphis has been found intact. The excavated tomb differs only from the built one by being solidly cut in the rock, the mummy-pit probably always opening from the chamber accessible to visitors.

These are the tombs of the subjects. The royal tombs of the same age are universally pyramids. In the case of pyramids the chapel was a separate building in front of the entrance. The pyramid itself was merely a mass of masonry containing the mummy-pit and the sepulchral chamber. From the form of the structure the pit was a sloping passage, ordinarily terminating in a horizontal one. Artistically the pyramids have an inferior interest. Their prodigious size, the vast labour employed in their construction, and their dignity, give them a charm with which their form could not have invested them. Their chief interest lies in the mechanical skill necessary to the removal of vast blocks of stone, and the construction of buildings of such prodigious size. We must remember, also, the extraordinary labour, probably that of an army of workmen, employed for some of these buildings, intended to be the sepulchres of single kings. They have been regarded by some as monuments of regal vanity; but if we look upon them as endeavours to express in a material form the idea of immortality, we shall feel that this enormous expenditure of time and labour for the embodiment of a leading article of belief has in it something worthy of admiration.

Without passing into the development of the tomb, which properly belongs to the subject of the next lecture, Mr. Poole observed that the brick pyramids of the great cemetery of Abydos of the next period of Egyptian history form a distinct link between the private tombs of earlier times and the stone pyramids. These little brick pyramids contain a vault above which there is a honeycomb-shaped vacant space, to economise the material. In some cases they have an external chapel in front attached to the structure (see Example E); in others the sepulchral services were performed in the open air within the court surrounding the building. So far the intention of Egyptian monuments, as we know them, is purely religious; in the next period historical purpose rules, to be afterwards supplanted by the religious.

The illustrations have been most carefully prepared in co-operation with Mr. Poole.

DESIGN FOR BELFAST FREE LIBRARY.

THE design which we illustrate this week was submitted by Mr. T. N. Deane in the competition in which Mr. Lynn's design was selected. It is one of the duties,—and privileges, we may add,—of an architectural journal to give some further publicity to designs of real merit which have failed to gain acceptance in competition, and no one will question that Mr. Deane's design is worthy of being known by more than the few persons who may have seen the collected designs exhibited. It is a very favourable example of the union of Gothic and Renaissance elements in design,

> "By no quite lawful marriage of the arts,"

(as Byron puts it), of which we see so much at present. The rich treatment of the centre portion in the principal elevation is very effective, and the arrangement of the windows is happily varied and expressive of the arrangement of the interior planning.

The Health and Sanitary Condition of the City of Coventry.—Judging from the annual report of the Coventry Medical Officer of Health (Dr. Fenton), which was presented to the City Council on Tuesday last, the 12th inst., it is not always a bad thing to be "sent to Coventry." The report shows that the past year has been an exceedingly healthful one for the inhabitants of the ancient city,—the number of deaths (741), from out of a population now estimated to be 45,000, as well as the death-rate (17), being far less than during any other year of which the medical officer has any record. The year has been characterised by an almost entire immunity from zymotic disease in a serious or fatal form, no deaths having occurred from either diphtheria, fever, or small pox. Coventry is, however, not without its unhealthy districts, where the houses, some of them of the oldest and most unwholesome description, are quite unfit for habitation, being built in courts and yards along the line of the streets so closely as to entirely prevent the proper circulation of air around them. Considerable improvement has in recent years been made in various parts of the city, and no doubt a considerable share of the mitigation in mortality now experienced arises from this cause. The work done by the Inspector of Nuisances, Mr. Booker, appears to be of a very satisfactory character,—a large number of nuisances being abated, sanitary works of a structural and permanent kind executed, and the sanitary by-laws and regulations duly enforced. It says much for the tact of the inspector that he rarely has to resort to the magistrates for assistance in securing the abatement of nuisances.

Exhibition of Architectural Drawings at Berlin.—The Administration of the Royal Berlin Museum has been exhibiting a number of curious and interesting drawings, embracing both architectural and decorative subjects. Amongst the principal objects in this collection are the following:—A rich ceiling, drawn by Daniel Narot (1700); as well as ceilings by Ægidius Schor, and an arm-chair of Peter Flötner (1540).

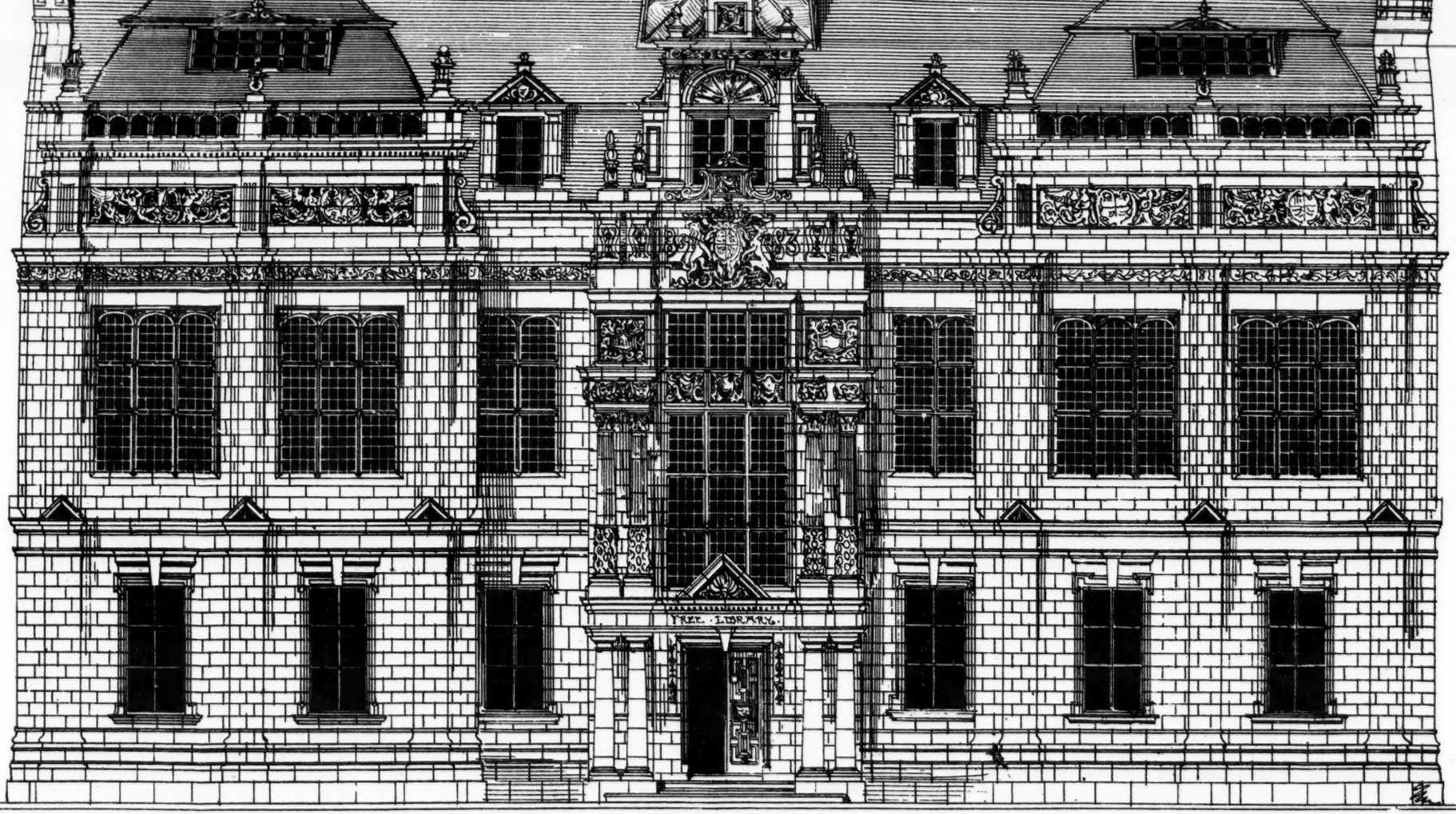
C.F. Kell, Photo-Litho. Castle St Holborn.

Wyman & Sons, Printers, Gt Queen St.

THE JUDGMENT OF THE SOUL BEFORE OSIRIS.

ILLUSTRATING MR. R. STUART POOLE'S LECTURE ON EGYPT.

BELFAST FREE LIBRARY COMPETITION



Front · Elevation.

MESSRS. T. N. DEANE, R.H.A., AND SON,
Architects, Dublin.

10 5 0 10 20 30 40 50 Feet

J. F. Kell Photo-Lith. & Printer.

8, Castle St Holborn, London, E.C.

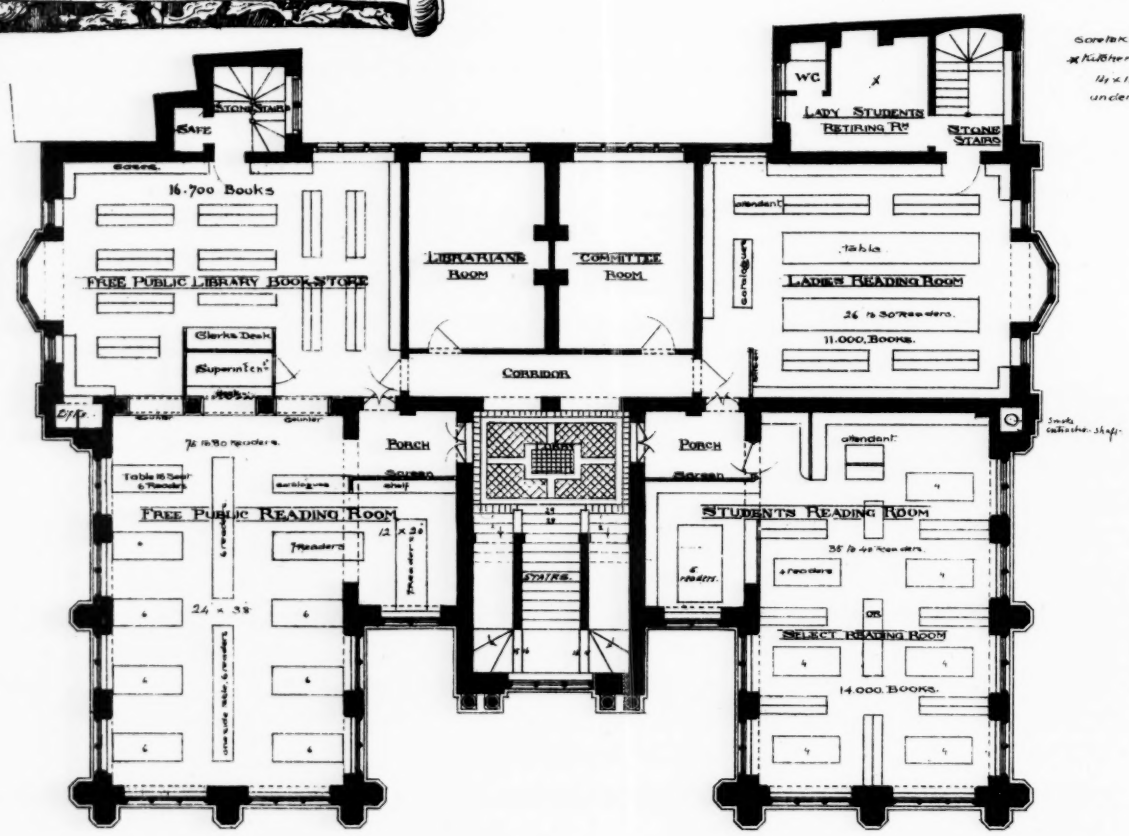
BELFAST FREE LIBRARY COMPETITION

Side Elevation.

MESSRS. T. N. DEANE, R.H.A., AND SON.
Architects, Dublin.

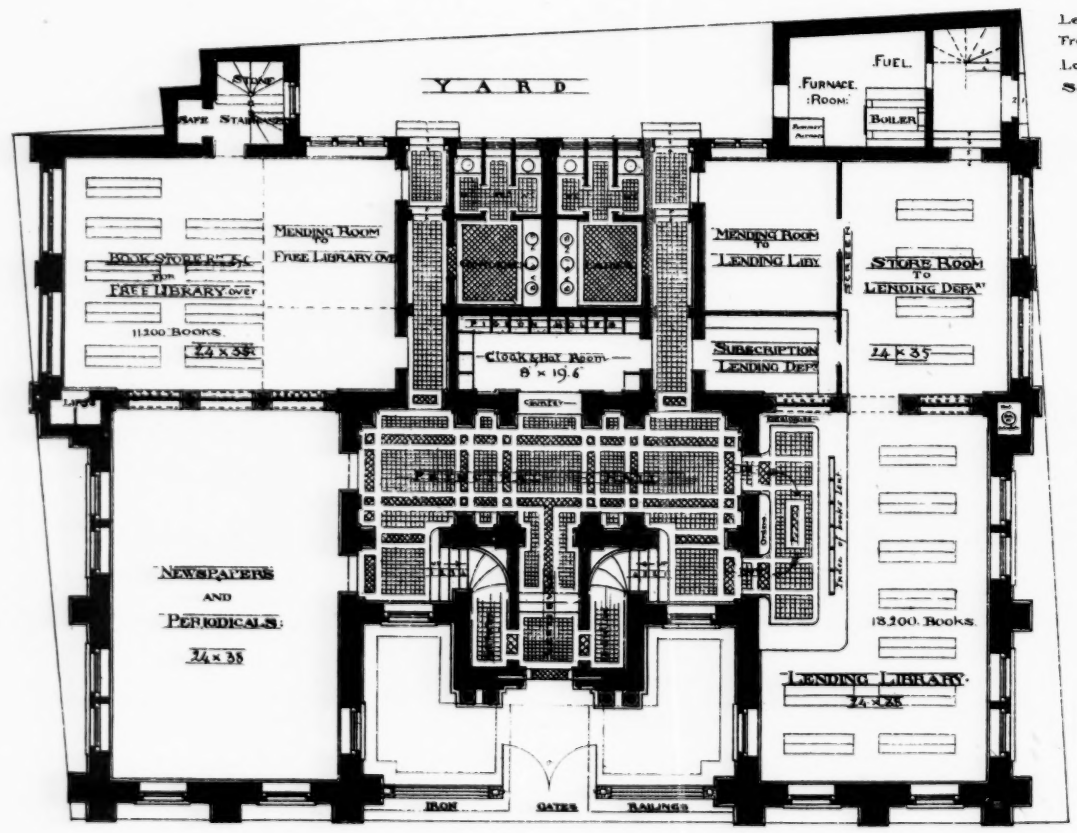
C. R. Kell Photo-Lith & Printer 8 Castle St. Holborn, London, E.C.

BELFAST FREE LIBRARY COMPETITION.



FIRST FLOOR PLAN

Scale of Feet.



GROUND PLAN

Scale of Feet.

T. N. Deane & Son Archts Dublin

C. F. Kell Photo-Lith. 8 Castle St. Holborn.

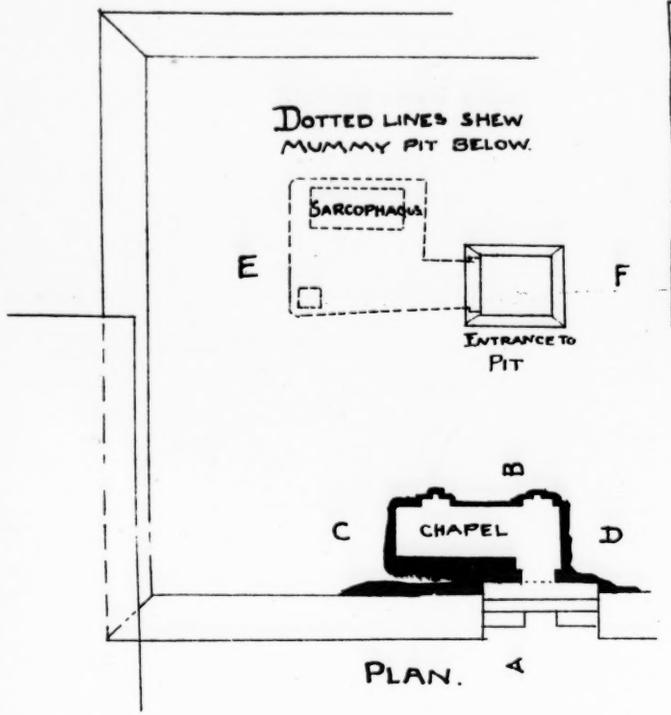
EGYPTIAN TOMBS

illustrating lecture

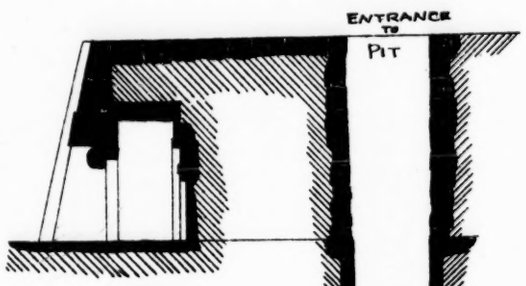
by Mr R. STUART POOLE

at The Royal Academy

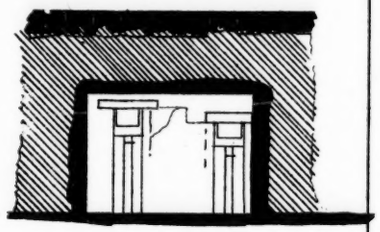
February 7th 1884



PLAN.



SECTION A.B.

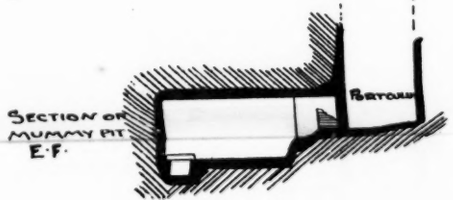


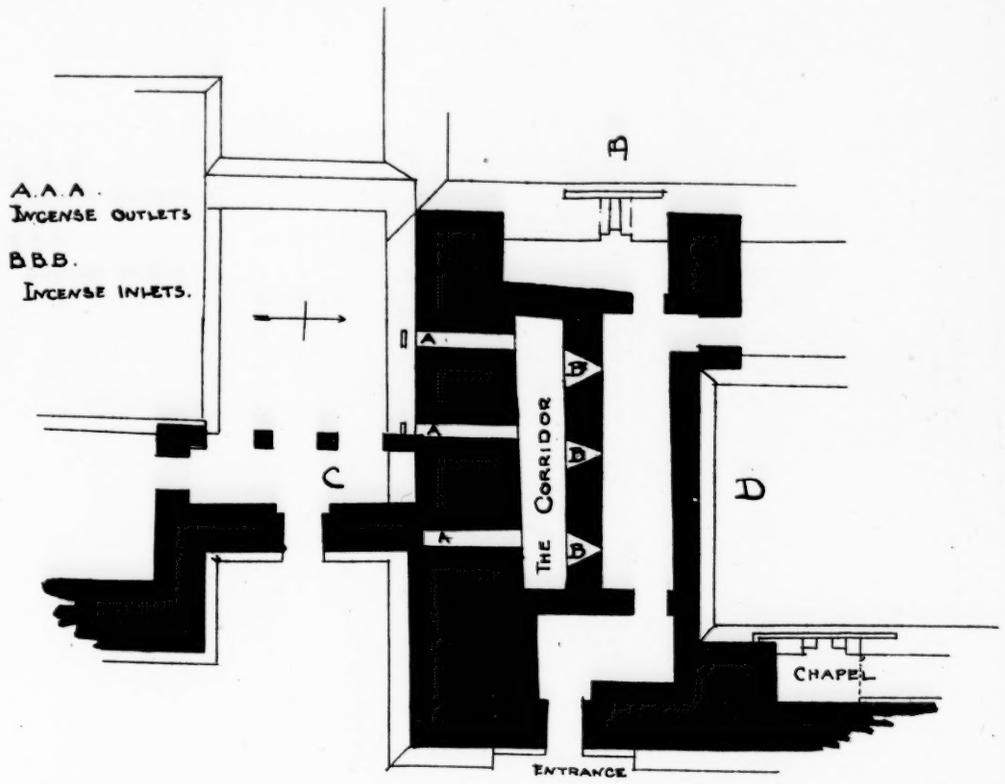
SECTION C.D.

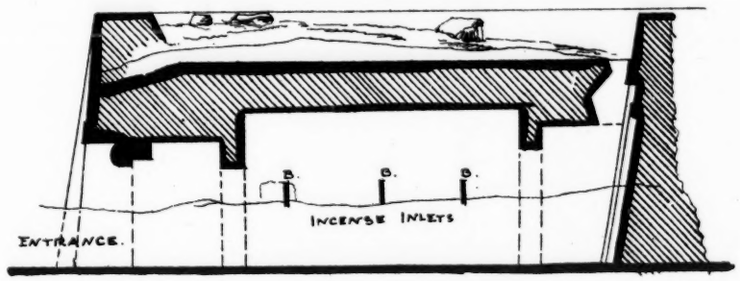
EXAMPLE . A.

TOMB from MEMPHIS.

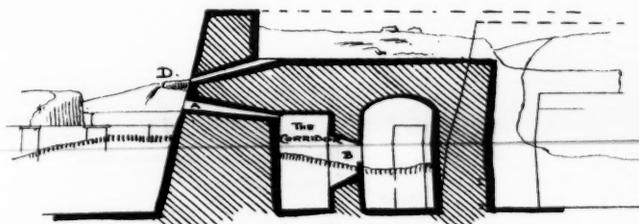
VIDE. LEPSIUS.

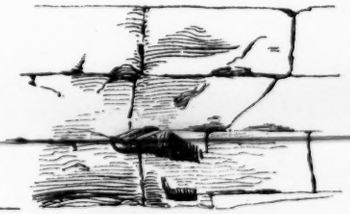






SECTION. A.B.





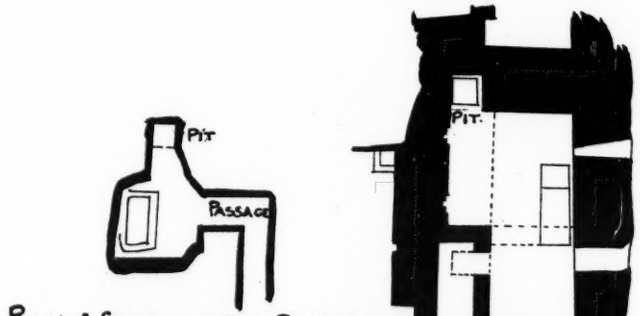
SKETCH OF CONDUIT

E.F.

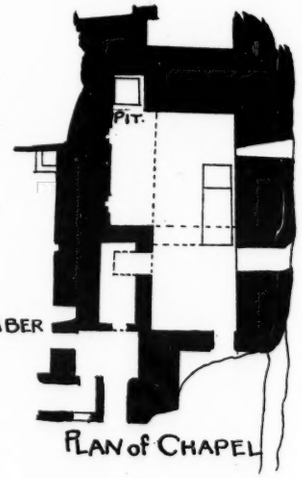
SECTION C.D.

SKETCH OF CONDUIT AND INCENSE OUTLET at D.

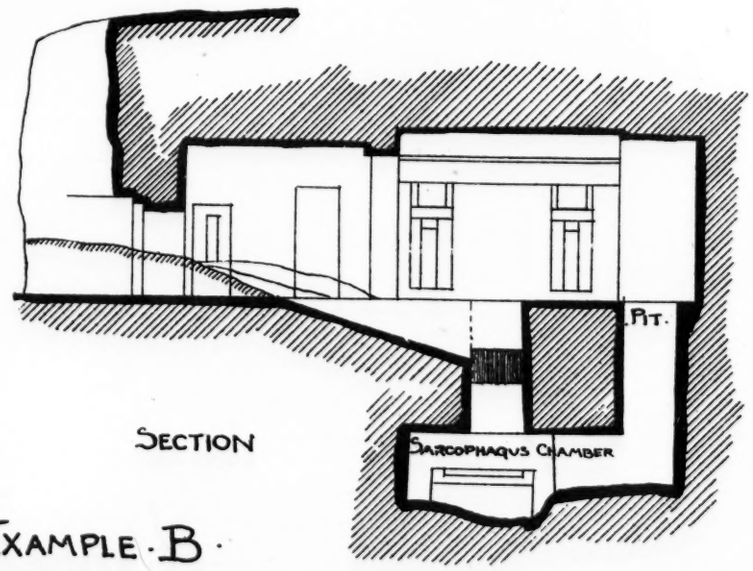
EXAMPLE · C · TOMB AT MEMPHIS from LEPSIUS.



PLAN of SARCOPHAGUS CHAMBER



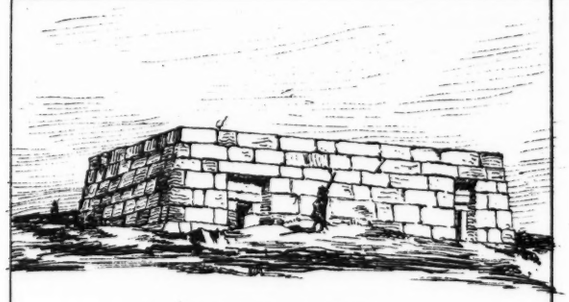
PLAN of CHAPEL



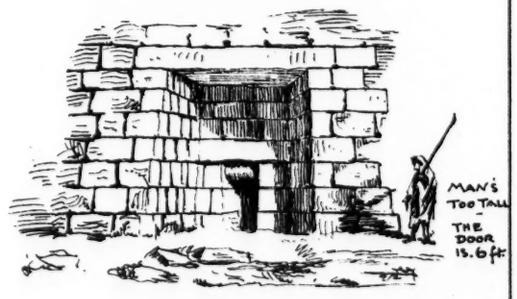
SECTION

EXAMPLE · B ·

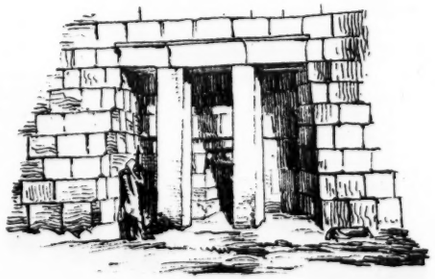
TOMB at MEMPHIS. from LEPSIUS.



AN EASTERN ASPECT.

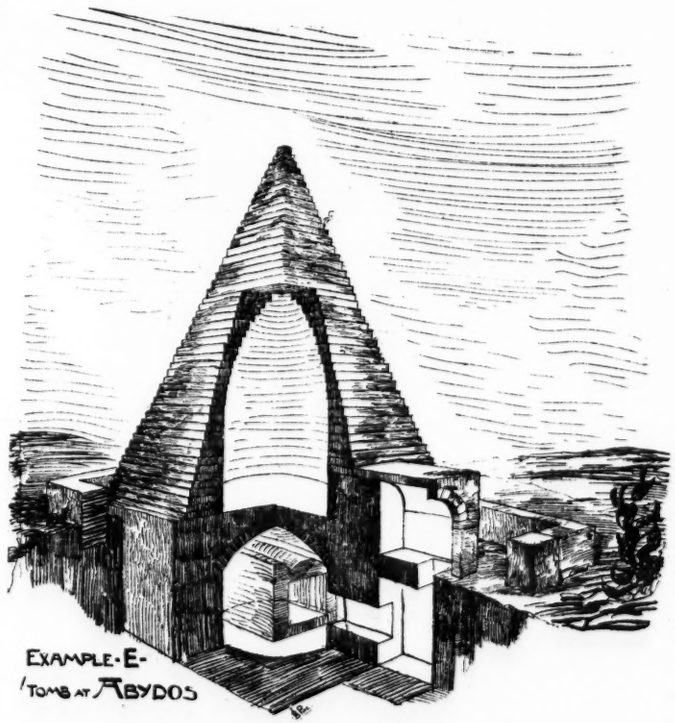


AN ENTRANCE



A NORTHERN ASPECT.

EXAMPLE D. PLATFORM TOMBS FROM LA REVUE ARCHÉOLOGIQUE



EXAMPLE · E · TOMB AT ABYDOS

C. F. Kell. Photo-Lith. & Printer.

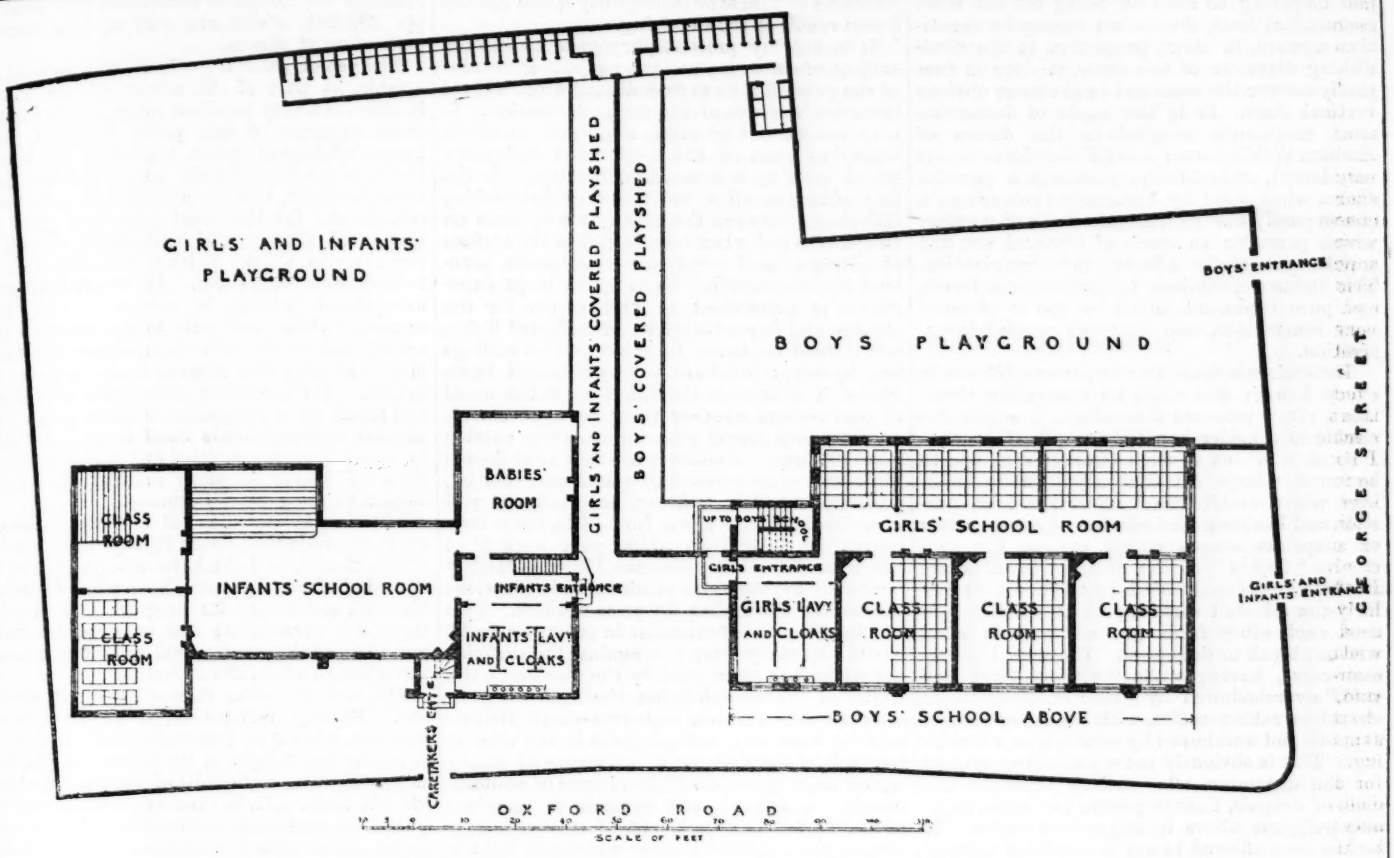
A. Beresford Pite, delt.

8, Castle St Holborn, London, E.C.

··· OXFORD · ROAD · BOARD · SCHOOLS ··· READING ··· ··· Morris · & · Stallwood ··· Architects ···

Wyman & Sons, Photo-Litho

C^t Queen S^t London, W.C.



BOARD SCHOOLS, OXFORD-ROAD, READING.—*Plans.*

BOARD SCHOOLS, OXFORD-ROAD, READING.

THESE schools have been erected on a commanding site in the Oxford-road, Reading, for the School Board, and have accommodation for 300 boys, 300 girls, and 440 infants. The girls and boys occupy the two-story block, and the detached one-story block is occupied by the infants. The girls are on the ground-floor, and the boys above, the one floor being a counterpart of the other. The general school-rooms are 70 ft. by 22 ft., divided into three compartments by revolving screens, and to each floor there are three class-rooms, each 25 ft. to 22 ft., all of which are lighted by windows at the pupils' left hand. In addition there is a large cloak-room, 25 ft. by 19 ft., on each floor, with lavatories. The lower rooms are 14 ft. high, and the upper rooms are 12 ft. to the plate, and 25 ft. to the ridge, the whole roof being open. The floors are formed in tiers, rising 4 in. each where the desks occur. The external walls are 18 in. thick, and all internal walls are 14 in. thick.

The infants' department has a general room, 52 ft. by 25 ft., with a gallery recess, 25 ft. by 20 ft., in addition. Two class-rooms, each 24 ft. by 22 ft., divided by revolving screen; and a babies' room, 27 ft. by 22 ft., fitted partly with hammocks; there is also a cloak-room, 26 ft. by 22 ft., with lavatory. One wing of this department is carried up to provide apartments for the caretaker, manager's room, and teachers' rooms.

The offices are approached by a covered way from each department. The whole surface of the playground is formed of asphalte, and was executed by Messrs. Bradshaw & Co. The school and class rooms are finished with dual desks, to the architects' own design, manufactured by the Darlington School Furnishing Company. The floors are laid with concrete and road asphalte, and covered with wood blocks to prevent noise. The fireplaces are fitted with Shorland's Manchester ventilating-grates. There are also vertical tubes on what is called the "Tobin" principle for introducing fresh air, and Lloyd ventilators upon the roofs for carrying off vitiated air.

The works were executed by the late Mr. F. Vaughan, of Maidstone; Mr. Streeter was the clerk of works; and the architects were Messrs. Morris & Stallwood, of Reading. The total cost of building, including playground, walls and fences, and all the furniture, was 7,200*l.*,—equal to 6*l.* 18s. 6d. per child.

ON COLOUR DECORATION.*

IT will, as a rule, be found that where a flat ceiling has to be treated in colour only, without any aid of mouldings, it is desirable to maintain white as the ground, or, at any rate, to retain a great deal of white,—for without white it is difficult to indicate with sufficient clearness the main lines as distinct from those which have no more serious purpose than ornamentation,—that is to say, to distinguish the lines which *affect proportion* from those which are a part of the *detail*. This rule does not apply with the same force on curved surfaces, where less artificial suggestion of form is demanded, and where, moreover, gold can be used much more freely should the circumstances admit of it. Putting aside for separate consideration the question of mosaic decoration, it may not be amiss here to consider the treatment of the interior of domes or cupolas, often the culminating point of a grand decorative work.

The sectional curves of cupolas, of course, vary infinitely; and the rules which should guide their decorative treatment must, therefore, of necessity be somewhat elastic. Nevertheless, one master-rule may be said to apply invariably. It is that the *vertical section* or contour must be expressed and explained by the decoration, whether in moulded surface or in colours. This expression may be made to assist or modify the actual curve, but in some form it is essential. Without it an appearance of distortion, or of instability, or of confusion, is almost inevitable.

The methods of explaining the interior contour are numerous, and their several employments may be suggested by the varying conditions of scale, light, proportion, or actual contour. In domes which vertically exceed the hemisphere, a vertical division into "sectors" is by far the most direct and satisfactory means of expressing the curve. The strongly-defined vertical rib or band offers to the eye the readiest means of traversing the surface upwards. The intervening spaces may then be subdivided simply or elaborately, by horizontal lines or by curved lines according to the further explanation or elaboration demanded.

One subordinate axiom as to this vertical division may be noted. It may be taken generally that the higher the curve of the dome, the more numerous should be the vertical lines. Thus a low flat dome may be divided by vertical bands into four parts or sections; but a high dome to receive a full expression needs to be divided into eight, twelve, sixteen, or more sections. The amount of horizontal division is generally far less important. Perhaps the explanation of this is that the eye perceives from the first that the horizontal section is circular; whereas the vertical section must always be unknown and demand explanation.*

When the dome is altogether on a large scale, it is essential that the vertical lines be expressed with more strength than any others. They contribute immensely to constructive expression, and to that effect of nobility which is given by height. There are, of course, plenty of well-known examples in which no systematic division has been adopted. In some early domes, usually of rather low section, figures are placed vertically on the unbroken curved surface. In such cases it is not easy to forget the distortion of those figures which do not face the spectator. In other instances, the surface is simply diapered with scroll or ornament. Of these I will presently say a word. In others, again (very few), figures or ornaments are arranged in horizontal bands or stories, which may be considered as the least satisfactory of all arrangements; but it is common to all these arrangements that the spectator can receive no impression of the contour or vertical section which it is in the very essence of the thing should impress him. Without the vertical expression, all that noble effect of stability and lightness, of solid structure soaring upwards by its own growth and with symmetrical perfection, is exchanged for uncertainty, and that curious mental demand for explanation which is a sure sign of defect in the artistic quality of architecture. It may be permitted the spectator of a great iron tubular bridge to "wonder how it is done"; for no sense of beauty is appealed to. But to the architect or his decorator the mere question is a severe criticism, if beauty has been his aim.

I have said that there are samples of domes in which the whole interior surface is merely diapered. It must, however, be noticed that if

* A paper by Mr. John D. Crace, read before the Architectural Association on the 1st inst. See p. 191, *ante*.

* The division of the interior of the dome of St. Peter's, and its expression by colour, may be quoted as an admirable example both for effect and simplicity. The interior dome of the Sorbonne at Paris is very similarly dealt with. That of the "Invalides" is divided into alternate plain and coffered "sectors," the latter each consisting of a single vertical row of diminishing coffers. The Chigi Chapel at Rome has a low cupola divided into wide and narrow panels alternately. The dome of San Francesco at Naples, like that of the Pantheon at Rome, is entirely divided into square "coffers," diminishing upwards; but both these have rather low sections.

this diapering be such as, being set out upon geometrical lines, diminishes during its repetition upward, in strict proportion to the diminishing diameter of the dome, it does in fact partly answer the same end as the more obvious vertical lines. It is the mode of decoration most frequently adopted in the domes of Arabian architecture; and (if the dome be not very large), undoubtedly, possesses a peculiar charm when aided by harmonious colouring; a charm partly due to a certain sense of mystery which pervades so much of Oriental art, and which powerfully affects the imagination. This influence, attained by geometrical forms, and pure ornament, aided by colour alone, is very remarkable, and deserves careful investigation.

The staircase is another important feature in every house; and since its decorative treatment often presents difficulties, it seems desirable to consider how they may best be met. I speak now not of such staircases as are to be found in large mansions, or in public buildings where architectural effect has been possible, and has been studied; but of those narrow or shapeless spaces which enclose the successive "flights" of the ordinary town house. In these one is confronted by the most irregularly-shaped wall surfaces, which usually succeed each other from ground floor to attic without break or definition. They are literally stair-*cases*, having walls "without form and void," overshadowed by a succession of equally shapeless raking soffits, with no expression of support, and unrelieved by so much as a moulding. This is obviously not encouraging ground for the decorator, who usually arranges the dado of despair, tints or papers the unmanageable polygons above it, and retires baffled. If he has been allowed to use a scrolling pattern in dismal greens he has perhaps the happy consciousness that he has imparted an "art tone" to the house by his treatment of the staircase, up which the visitor gropes his way in a monotony of green fog. But this is "fashion," not "art."

Where it is practicable,—and it is so in some of these staircases,—it is very desirable to make a broad distinction of colouring between the lower and upper stories, inserting a sort of string course at the level of, perhaps, the first floor. This at once gives breadth and stability of appearance, and helps to counteract that effect of perpetual treadmill which is so unpleasant in mounting an ordinary London staircase. Where it is not possible satisfactorily to effect this marked horizontal division, it is possible, and frequently advantageous, to adopt such a design of decoration or paper-hanging as admits of the repetition of horizontal lines at brief intervals. This was the one good feature of the old marbled papers in blocks, and which still leads people to assert that a staircase looks larger with a marbled paper, the sense of width being in fact due to the horizontal joints, not to the figure of the marble. Designers who have perceived this fact now produce patterns arranged on the same block system, and suitable for narrow staircases.

Where an open well-staircase exists, with stairs to the first or second floors only, and open wall above, much may be done with moderate use of colour in cornice and frieze to give a value to the whole. In such cases there should certainly be a well-defined frieze or string course at the level at which the stairs cease.

The soffits of the stairs may often be advantageously panelled out with mouldings, but where they are the plain soffits of stone stairs this is not very readily managed, and one must then have recourse to colour. A very simple use of even coloured lines will often be of considerable value. Again, much may be done to relieve the meanness and monotony of a London staircase by making a sort of vestibule or separate feature of one of the principal landings; and concentrating there your richer colouring and ornamentation instead of frittering them away in driblets over the whole.

The use of stained glass in one form or another has become so frequent for domestic purposes that it is no longer necessary to advocate it. Perhaps it is rather necessary to ask for discrimination in its use. It does not accord well with light tints of pure tones in the decoration; but with low tones, whether light or dark, and with deep rich tones of colour it may usually be adjusted harmoniously. There are, of course, some restrictions connected with style which it is well to observe, because no mind trained in the history of art can altogether shake off those impressions of fitness or incongruity which are the direct result of such training.

It is not my present purpose to go into the subject of colour harmonies, but rather to treat of the general laws and conditions which should influence the use of colour in decoration. It may not be out of place, therefore, to allude briefly to some of the unexpected difficulties which crop up in practical decoration. In the first place, to allow for the very astonishing differences between the colour as it appears on the palette and when transferred to the surface of ceiling or wall requires a considerable practical apprenticeship. Even a very large experience is insufficient to prepare one for the strange and fantastic tricks of reflected light; and it must be borne in mind that all ceilings are, by day, lighted entirely by reflected light. Hence it makes all the difference in the world to your colours whether there be a pavement. or grass, or a gravel path immediately outside your windows. So does it whether your floor is ultimately to be covered by a dark carpet or by, perhaps, a yellow matting, especially as you must know how to allow for either, since they cannot be laid down whilst your work is in progress. Your difficulties are, likewise, largely increased by the false shadows and reflections thrown on the ceiling by your scaffold. This is a fertile cause of mistakes in colouring, and I would especially warn you against the scaffolding which has been used by the plasterers, the whitened boards falsifying the light on your work, to your ultimate embarrassment. On this account when any critical point in the work is reached for the decision of questions of colour agood large space should be cleared of scaffold-boards. A fall of snow compels a complete pause, so far as adjustment of colours is concerned, the conditions under which the light is reflected being rendered completely abnormal. It is but a few weeks ago that in some very simple work in London I found myself frequently at fault in one front room, and discovered that this difficulty was entirely due to red blinds drawn down in some windows of a house on the other side of the street; though by no means directly opposite they were at such an angle to the room at the hour of my visit as exactly to reflect direct rays of red-tinted light into my room.

I have in former lectures spoken at length on the use of gilding in decoration, but cannot altogether pass it by here. Properly used it is most valuable, serving, as it does, several distinct purposes. It is valuable for explaining form, for lighting-up, surface ornament, for separating colours, and for the mellowing effect it has on all colouring. It gives the decorator a ready means of "emphasis," serving to carry the eye to the right points and along the right lines, even in the shadowed parts of the work, or where the colouring is deep enough to make emphasis of colour alone difficult. It should be borne in mind that gilding, to be successful, must be used boldly and with very defined purpose, because in some lights you will see the gilding when you cannot distinguish colours. Timid gilding, in meagre lines or detached patches, is always to be avoided. It has the same sort of effect as cheap finery, and is destructive of repose. Gilding, properly used, even where very freely used, never looks tawdry or vulgar; and where you find an interior spoken of as vulgar or tawdry from over-gilding, you may depend upon it that it is less the quantity of gold than its being in the wrong places which has produced the effect.

Reverting, indeed, to the question of "emphasis" in decoration, whether by gilding or otherwise, I may say that nothing is more essential to the success of any decoration. Its absence or insufficiency make any arrangement of colour very much what writing is without punctuation, or what speeches are without aspirates. Just in the same way the use of purposeless and patchy gilding makes of a decoration much what misplaced aspirates make of a speech,—an untelligible and vulgar jargon.

The use of gold ground mosaic for the purposes of decoration is a subject in itself, and I will only briefly allude to it here. A magnificent material for work of a monumental character, it seems to me unfitted to use promiscuously or in small patches, and *on the level of the eye*. I venture to protest altogether against its use for pictorial purposes in the small panels of a reredos, for instance. It can only be used with really adequate effect on large surfaces free from mouldings. It is worth while to turn to Ruskin's "Stones of Venice," and read his remarks on incrusted decoration (St. Mark's, pp. 23, 24), which are full of true artistic perception of fitness.

The use of natural products, such as wood or marble, as part of the colour scheme of any interior, is a very excellent thing, and has made great progress of late years, though I have known architects paint handsome oak balustrades white for fashion's sake. The decorator must, however, bear in mind that these natural colours are for the most part very quiet in tone, and that careful modulation of tone is necessary in all the painted ornament that is to harmonise with them. All woods (with rare exceptions) belong, in colour, to the "low tertiary" class; and pale bright tones do not readily harmonise with them, although colours may be so used with them as to appear pure and bright. Marbles are of purer tones than wood, and admit of a somewhat brighter scale. No natural material lends itself more favourably to decoration, the mottled and varied combinations of colour in many marbles being most helpful to the general harmony.

The time at our disposal has not permitted me to do more than touch lightly on those rules which should, as I think, be always present in the mind of the decorator, both when designing his work and during its progress. To all rules there are exceptions; but only careful study and the experience of actual practice can teach you when to admit the exceptions.

The art of colour decoration is no simple one. Rightly understood, it requires much training, a habit of observation, and that sense of colour and delight in its harmonies which is as much inborn as the gift of music; but which, like the latter gift, is valueless without earnest, long, and continued cultivation. A man may be an accomplished architect, with sound and artistic sense of form and composition, and yet be a very poor colourist. Indeed, some go so far as to say that the mental training of the architect may be compatible with the art of the sculptor, but is not favourable to a sense of colour. I think that this, however, must depend much upon whether he starts with a strong sense of colour,—for if he does he can hardly fail to cultivate it. In any case a knowledge of the artistic side of architecture is indispensable to the formation of a good decorator; without it he cannot possibly sympathise with the architect's intentions, nor give intelligent expression to architectural forms.

It is quite certain, however, that unless a man be gifted with more than average powers he will rarely excel in both arts. Probably many an architectural student will drift into decorative work; and it is better to be a really skilful decorator than an indifferent architect. If he does so let us hope that such of his fellow students as distinguish themselves in the noble building art will call on him to aid them in perfecting and vivifying their work, nor fail to give him the credit due when he has used his magician's wand,—

> "Miserum est aliorum incumbere famæ,
> Ne collapsa ruant subductis tecta columnis."
>
> "'Tis dangerous building on another's fame,
> Lest the substructure fail, and to the ground
> Your baseless pile be hurl'd in fragments round."

[For a report of the discussion which followed the reading of this paper see p. 213, *ante*.]

An Outdoor Latrine.—The Chicago *Sanitary News* for January 15th gives a drawing of a form of outdoor privy, which has been designed by Messrs. Weatherby & Co., of Grand Rapids, Michigan, for avoiding some of the *désagrémens* of the ordinary establishment of that kind, in situations where there is at present no provision for a more civilised kind of accommodation. Under the ordinary privy seat is a vertical cast-iron receiver, a wide iron-pipe in fact, at the foot of which is a trap kept charged with water by overflow or rain-pipes from the house (which of course, in that case, must be additionally trapped between the house and the receiver. The soil drops into the water, and is supposed to be carried away at each flush of the trap from the discharges from the house waste-pipes and rain-pipes, and so goes to a water-tight cesspool at some distance. The point of the contrivance is, of course, the separation of the cesspool from the immediate proximity of the privy, and the keeping it closed, except when opened for cleaning, instead of having it permanently open as in the ordinary privy.

ARTISANS' AND LABOURERS' DWELLINGS.*

THE BUILDINGS OF THE PEABODY TRUST.

EACH living-room is amply provided with cupboard-space. In addition to two cupboards with shelves in the living-room, a large closet is fitted up in a recess which forms a sort of vestibule to the room near the entrance door. This contains a coal-bunk sufficient to hold half a ton of coals, and several tiers of shelves above. Most of the bedrooms have closets in the recesses formed by the chimney-breasts, furnished with rails and hooks for hanging clothes.

A broad wooden shelf on iron brackets, and 15 ft. lineal of picture-rail with hooks, are fixed in convenient positions against the walls. All bedrooms have fireplaces, fitted with plain fire-lump stoves, 1 ft. 9 in. wide, and are supplied with 10 ft. lineal of picture-rail, similar to that in the living-rooms.

The laundry accommodation occupies the attic or central portion of each block on the top floor. It consists of two wash-houses containing washing and rinsing tubs, boiling coppers, tables, and other requisites, and a large laundry for drying the clothes.

One or two baths are provided for each group of buildings, according to the number of blocks upon the site; formerly more than these were supplied to the tenants, but they were so little used that their space was more profitably appropriated, and the present number has been found to be quite sufficient. The baths are of terra cotta, with a fine durable glazed surface; they are provided with fittings for the supply of cold water only. Each bath-room is furnished with a trellis-framed footboard and seat.

There are two sinks on each landing, placed in recesses on either side of the staircase. They are of terra cotta, and are fixed upon stout wood bearers, with a draining-board at one end sloping to the sink. Provision is made at the foot of the waste-pipe for the removal of any obstruction which might foul the trap.

The water-closets adjoin the recesses in which the sinks are fixed. Two are provided on each floor, viz., one for each sex. They are fitted with white glazed pans and stout galvanised iron apparatus. All the closets and sinks are over each other throughout the building, and are so situated as to secure a direct supply of water from the cisterns and an immediate discharge of the waste to the drains.

The waste-pipes are connected throughout their entire length with ventilating-pipes carried above the roof. In order that they may be occasionally examined and freed from the various obstructions with which they are too often choked, each stack is intercepted a few feet above its entrance to the drain by a small examination chamber with an iron flap and frame fixed at the base of the rear wall of the building, and secured by a strong latch and key.

The drains are of the best brown stoneware glazed socket-pipes, of Doulton's manufacture, laid with a fall of at least 2½ in. in every 10 ft. lineal of their length. The soil drains are 6 in., 9 in., and 12 in. in diameter, according to the quantity of drainage they have to discharge; the surface and water drains are generally 4 in. in diameter. All the joints are carefully set in cement, and every precaution is taken to render the setting as clean as possible, so as to prevent obstruction to the free passage of the drainage over the joints of the pipes. It is desirable, if possible, to arrange the drains of a group of buildings occupying one site, so that the whole drainage system may be entirely confined within the limits of the site itself, and not carried beyond them until its discharge has been brought to one point in the most convenient situation for connexion with the nearest main sewer. At this "point," an examination-chamber should be provided sufficiently large to admit of the various obstructions which find their way into the drains, being removed before they can choke the outlet and drive the sewer-gas into the dwellings. If the position and distribution of the blocks in relation to the surrounding streets are such as to prevent the entire system of drainage from being confined within the limits of the site, it is desirable that the connexions with the adjacent main sewers should be as few as possible, and that the examination-chambers be placed where they can be conveniently examined and be quite away from the buildings. It is needless to observe that no drains should pass under the buildings themselves, and that all waste-pipes should be fixed against external walls only, so as to admit of their direct outside discharge.

Water is supplied to the dwellings by a rising main fixed in the centre of the building, so as to be protected from cold in severe weather. This feeds the cisterns in the roof and immediately over the laundry. At the foot of the main a small draw-off cock is provided to empty the main in time of frost. The cisterns are of strong galvanised iron, and contain an allowance of forty gallons of water per day to each dwelling. They are three in number, viz., one large one, which receives the water direct from the main, and supplies the services for drinking and cooking purposes, and two smaller ones, which receive its overflow, and supply the water-closets and washhouses. Thus, although the cisterns are close together, and served by one main, they are not connected, and the water used for different purposes is not obtained from the same source. The overflows from the smaller cisterns discharge into the sinks on the topmost floors of dwellings, and have no direct communication with the wastes of the sinks themselves, or those of the water-closets. The various service-pipes are of galvanised iron, and lead direct from the cisterns to the washing-troughs, boiling-coppers, sinks, and water-closets. They are furnished with high-pressure loose valve-cocks, which are the best, as least liable to leak, and, if properly treated, answer their purpose well; but although every precaution be taken to prevent waste of water, this cannot be entirely avoided. As the buildings are lofty, the pressure in the company's main is often so great as to overpower the ball-valves which regulate the supply to the cisterns, and more water is discharged than can be used or accounted for. This is one cause of waste; another is the carelessness of the tenants themselves, who neglect to properly close the cocks after use. In consequence of this loss both to the consumers and the water companies, the latter have felt obliged to place certain restrictions on their supply, which are found to be so adverse to the consumers' interest, that they are being met by a strong and united opposition, and it is not improbable that a Bill may be passed during the coming session of Parliament by which water will be uniformly supplied by meter, and a high service constantly maintained.

Gas is provided for lighting the entrance, staircases, washhouses, and laundries, but it is not supplied to the dwelling. It is lighted at dark, and put out at eleven o'clock, when the outer door of the building is closed.

There is but little to remark on the general construction of the blocks beyond what has been already stated. The materials employed are simple, and of the best description. Owing to the frequency of defective foundations on the sites which are selected for buildings of this class, and the absence of sand, gravel, or other available material which could be employed in the construction of the blocks, the cost of their substructure is often a very serious item. To reduce this as far as possible, in cases where the foundations have been carried to a great depth, the superstructure above the ground-line has been built upon arches in three and four half-brick rims in cement upon massive piers of concrete, brought up from a solid bed of maiden earth, and whose position on plan corresponds with the wall-spaces of the work above. By this arrangement a considerable saving is effected in the cost, and the stability of the building is increased. All the walls and partitions between the rooms are of brick. The external walls are of picked stocks, relieved at intervals with flush bands of hard Suffolks. The external angles to the height of the string-course under the first-floor windows and the principal entrance doorway are of the hardest terra cotta. The cornice is composed of plain and bevelled Suffolk bricks, in alternate bands, finished by the filleted cast-iron eaves-gutter, which serves as the crowning member. The roof is boarded, and covered with Bangor slates; the ridges and hips are also of slate. The chimneys are placed as uniformly as possible with regard to the ridge, and in order that back smoke may be avoided, the fireplaces of adjacent rooms are not generally placed back to back.

The floors of the dwellings are of wood, which is not only more comfortable than tiles or concrete, but is less liable to damage through the chopping and breaking of fuel, or other rough treatment. Wooden floors, moreover, if properly constructed and provided with a well plasterered ceiling below them, offer a more effectual obstruction to the advance of fire than those which are called "fireproof," as is proved by the low premium required by the offices in which they are insured.

The floors of the sculleries are of stone, those of the washhouses and laundries are covered with asphalte on a bed of concrete resting on iron joists. The staircases and landings are of stone.

The whole of the internal walls are finished with a thin coating of Portland cement, which is very hard and affords a better protection from ordinary dilapidation and from vermin than common plaster. The entrance vestibule, staircase, and passages to the height of 4ft. 6 in. are finished with a fine surface of cement of a deep red colour, which gives a warm and finished appearance to the interior of the building. A narrow band of buff tiles 2 in. wide finishes it against the cement coating of the rest of the wall.

The open spaces or courts which surround the buildings are covered with Hobman's tar-paving, laid upon a bed of rough concrete, and finished with a fine surface resembling asphalte. This has been found to answer better than gravel, which is dusty in dry weather, and is suggestive of stone-throwing and broken windows; it is preferable also, on account of its appearance and economy, to stone or brick paving.

The buildings are substantially built and plain in appearance; their arrangements have been made as simple as possible, to ensure economy in their original construction, and to avoid excessive demands upon revenue for their annual maintenance. Objections may be raised to this simplicity, as interfering too much with the comfort and domestic privacy of the tenants, and it may be said, that though the cost of land and the difficulty of obtaining sites where dwellings for the poor are most required, may make it expedient to provide for several families under one roof, yet the evils of association are increased by not sufficiently separating their accommodation; that the water and washing arrangements need not be in common; and that in many of the buildings which have been erected with a similar though perhaps not identical object, the dwellings have received that desired privacy by being made self-contained. It is to be feared, however, that this privacy is more apparent than real; by crowding the various water services, laundry furniture, and other domestic conveniences into one small chamber or scullery, as it is usually called, not only is the dwelling rendered unwholesome by having these in the near neighbourhood of the rooms which are occupied for living and sleeping purposes, and so depriving them of their proper freshness; but the decencies of the tenant's social life are seriously imperilled, if their own evidence is to be believed.

Self-contained dwellings, occupying several stories under one roof, cannot be compared with two-storied cottages, provided with small yards, and the requisite outbuildings, whose less-confined area allows their occupants comparative freedom from observation. All the arrangements of cisterns, pipes, and drainage are much more complicated in one case than the other, and their liability to get out of order, and their frequent need of attention and repair, render their maintenance much more expensive and troublesome. They form, too, so serious an item in the first cost of each dwelling, that a moderate rent is unable to supply a remunerative profit; consequently, a high rent is required, and those whose wages are insufficient to meet it are either excluded or compelled to take lodgers. Supposing, however, that profit were left out of consideration, and that the rents were regulated according to the most moderate scale, it would still be undesirable, as we have already shown, to supply the poor with conveniences which are seldom found even in the chambers and associated dwellings of the better educated. The lower sections of the industrious classes are not accustomed to treat anything which they use daily, and which does not belong to them, with much care or consideration; the strongest and plainest of the fittings with which their dwellings are furnished are too often incapable of resisting their roughness; and the recklessness with which they are handled, and the damage

* A paper read by Mr. H. A. Darbishire, F.R.I.B.A., Architect to the Peabody Trustees, at the Parkes Museum, on the 31st ult. See p. 192, *ante*.

which is done through their inability or unwillingness to be gentle, show how desirable it is to supply their wants in the simplest manner possible, and to give them the fewest opportunities for mischief.

The arrangement of dwellings in blocks has also been objected to. If sites were plentiful, unlimited in extent, and obtainable at a nominal cost, this objection might have weight, but so long as it is extremely difficult to get any site at all in localities where dwellings are most required; so long as the areas of such sites are so limited that they cannot be regarded as very desirable when they are acquired; and so long as the cost of these scarce and limited spaces is out of all proportion to their apparent value, so long will it be a matter of necessity to utilise every foot of space as far as can be done consistently with health and convenience.

The cost of a block of the dimensions already given, and containing fifty rooms, twenty sinks and closets, dust-cellars, stores, washhouse, and laundry, is about 4,000*l.*, or 80*l.* per room. As the dwellings are not uniform in size, even in the same block, and, as in several instances of buildings already built it has been found expedient to regulate the rents according to the wage-earning powers of the population to be benefited, no uniform scale can be quoted, but taking an average the rent of a dwelling is 4s. 7d. per week, and of a room 2s. 1d., which includes everything. The weekly earnings of the tenants in 1882 averaged 1*l.* 3s. 6¼d. per week, and the net return on the total outlay on land and buildings was 3½ per cent., after allowing a deduction of 30 per cent. for all expenses of repairs, management, &c.

This return will not be considered sufficient to induce a commercial public to regard the buildings as a good investment for capital at all equal in amount to the necessity which exists for them. Although it may not be enough to secure what is called "commercial success," it does more than enable the dwellings to be self-supporting, and it might be considerably increased were not the tenants required to assent to a condition, the importance of which cannot be too highly estimated, as any one acquainted with the habits of the poor will readily acknowledge. *No underletting is allowed* in these dwellings, under any pretext whatever.

This restriction prevents the tenants from increasing their weekly receipts, except by their own exertions; in other words, their standard of wages continues to indicate the section of the working class to which they belong. If, therefore, the dwellings are planned for the use and occupation of any particular section, and the rents are fixed according to the wages which that section receives, the accommodation supplied and the rent paid are justly balanced, and no unfair advantage is gained on either side; but, on the other hand, if the accommodation be too large or too small in proportion to the rent, and consequently to the requirements of the tenant, the balance is destroyed, and loss on one side must follow in consequence.

The sectional division of the working classes which we have advocated, if faithfully observed, will, it is believed, be found to do more towards securing and maintaining a just balance, and in advancing the social and moral interests of the poor, through the improvement of their dwellings, than any other arrangement which has yet been adopted; but it will not obtain a high revenue. Those who require this must be willing to sacrifice the interests of the poor for their own benefit. The demand for dwellings is so great that even the least desirable are eagerly applied for, and there is no difficulty in letting them at rents sufficiently remunerative to realise a very handsome income. This advantage has its drawbacks, however.

Independently of any condition as to the means by which the rents are paid, the tenants naturally adopt those which most readily occur to them for the supply of any deficiency that may arise from their weekly wages. Knowing that there are many who cannot afford a home of their own, and who even prefer an unsettled kind of life, they can calculate with confidence upon a considerable addition to their funds, as soon as they are prepared to sacrifice their privacy and to crowd their rooms with lodgers. The evils which follow need not be entered into now, but they are many, and their effects, especially upon the young, are so serious that, were they generally known, a fairly moderate return would be regarded with less disfavour, and the present compromise between self-interest and philanthropy would come to an end.

The conclusions which may be drawn from these imperfect remarks may be summed up in a few words, viz.:—

That before the working class, as a whole, can be suitably provided with dwellings, it should be divided, as far as possible, into sections.

That the standard of wages affects this division more accurately than any other, and affords the best means of determining the accommodation which is most consistent with the habits and mode of living of each section.

That each section should have its dwellings arranged with strict reference to its requirements, so that they may not be too large for convenience nor too confined for the purposes of securing health.

That the size, shape, and regular construction of the dwellings affect their cost and adaptability to the site upon which they are built, their sanitary condition, and the resources of the tenants.

That self-contained dwellings more than two stories in height are undesirable as residences for every section of the working class, and the privacy which is put forward as their chief recommendation is proved by experience to be more apparent than real.

That the rents of the dwellings should be proportionate to the wages of the section for which they are provided, and that no more than a fairly remunerative profit should be expected from them, so that the tenants may obtain the greatest amount of benefit in return for their rent; and lastly,

That the evils of underletting are most serious, and considerably exceed the advantages derived from any mere commercial success, which the buildings are able to yield by its aid.

In conclusion, there can be little doubt that in consequence of the interest which has been awakened, many undertakings will be organised, which have for their object the improvement of the dwellings of the poor. Whether these are to work on a definite system or not; whether their chances of success are to depend upon dearly-bought experience, or rest upon the uncertainties of experiments fostered by good intention; whether the anticipated benefit affect the entire working class or be confined to only one section of it; whether self-contained dwellings, or those which have been just advocated, be approved as the best,—certain it is, that after a comfortable and suitable dwelling has been provided, it rests more with the working man himself, than with any one else (except his wife), whether it prove as great a blessing as is expected and hoped for or not; and if the increase of wages and the additional leisure, which time and change have lately brought to him, are spent in the public-house instead of at home, the best-arranged dwelling that ever was built will do him no more real good than the most miserable cabin.

In the discussion which followed the lecture, The Chairman (Captain Douglas Galton) remarked that Mr. Darbishire had shown what could be done by a great and powerful association in providing dwellings for a large section of the people. In remodelling London they could not do better, possibly, than follow in the steps of the Peabody Trustees. It was our neglect that had led to so much overcrowding in London. If people chose to live in communities they must submit to certain laws and regulations which would be quite unnecessary for dwellers in the open country. One had no right to do anything in one's house which would be injurious to one's neighbours, and the community had the right to require that the houses occupied should be in a thoroughly satisfactory condition, whatever was the class of occupiers, and that these occupiers should conform themselves to regulations. A great amount of good could be done by legislation, which, he hoped, would not be wanting in this direction. The Peabody Trustees were a reproducing body, devoting their profits to the improvement and extension of workmen's buildings, and a commercial company could not do that. He would like, however, to see a company started on the basis of selling dwellings, by the payment of instalments, to the working classes, so that each man might become, by degrees, the proprietor of his own house. What was required was to make the working classes the owners of property, which would be a real source of national stability.

Sir Curtis Lampson, bart., one of the Peabody Trustees, said that their experience had been that of all people who had built houses, but they had profited by experience. He had found a constant tendency to overcrowding, which required the closest supervision. The Trustees received over 1,000*l.* a week in rents, and they had not made a loss of 100*l.* in a year. The death-rate in the buildings for the last five or six years showed about two in the thousand less than all London, and considering that they housed the poorest of the labouring classes, it showed what could be done by sanitary arrangements, and light and air. The question had now forced itself upon the attention of the Government, but he did not know how it would be solved. The present state of things in London was a disgrace to any Government. Economy of space was of such importance that he would not allow two-story houses in London proper, but would make greater elevation obligatory. The Artisans' Dwellings Act he considered a failure,—it was a measure which seemed only to have been made for the benefit of professional men. No one had yet put forward a practical plan for getting over this great difficulty, but he hoped that, in course of time, the London poor would be supplied with good dwellings.

Mr. Mark Judge said that many of the poor preferred the self-contained dwellings, and the cheapening of transit from the centre of London to the outskirts was a most important matter. Mr. Judge moved a resolution recommending the Council of the Parkes Museum to appoint a representative committee of medical men, architects, and sanitary engineers to investigate the whole question.

Dr. Rutherford seconded the recommendation, which was opposed by Mr. Dickens, of Kensington.

Dr. Poore remarked that some time since he was employed to make a report for the *Lancet*, on the dwellings of the poor. He believed that the only way to solve the question was to have a proper Building Act. A house should be licensed, like an omnibus, to accommodate so many inside, and no more. In proportion to the cubic space of the houses, so there should be a proportionate curtilage. He found that overcrowding was worst, not in the East End, but in the old houses in Soho, which had once belonged to the nobility. Excessive legislation only increased the difficulty; the great thing would be to educate the individual.

Mr. Judge's recommendation was then adopted by the meeting.

MECHANICAL APPLIANCES AS AN AID TO SCULPTURE.

SIR,—I have read with interest Mr. George Simonds's paper dealing with the above,* in which he says,—"Watt and Chantrey are said to have joined forces to effect it, but do not seem to have been altogether successful." I have been occupied for some months in searching various records, and have now in the press a book on "Stone-working Machinery," which, although chiefly dealing with the conversion of stone for building purposes, will contain a chapter on sculpturing machinery and a description of Watt's machines. There can be but little doubt that these machines, of which I have photographs before me,—were successful, and several busts and bas-reliefs executed by them are still in existence. A lengthened description and drawings of the machines will be found in a paper read before the Institution of Mechanical Engineers at Birmingham on November 1st, 1883, by Mr. E. A. Cowper, and I would refer any one desiring full information to that paper. A condensed description may, however, be of general interest to your readers. The first machine Watt called an "Eidograph," and it was used for sculpturing or copying busts of the same size as the original. The machine,—which is still in existence,—consists, firstly, of an ordinary lathe, with treadle and fly-wheel, to supply the motive-power; and, secondly, of two tall uprights, about 7 ft. high, carrying at the top a slide on a strong horizontal bar; the slide being capable of motion horizontally, either at a slow or quick speed. Then, hinged to this slide, is a light square frame of metal, and, at the outer edge of this, another light square frame of metal is hinged, so that the lower edge of such frame is capable of motion

* See *Builder*, pp. 91, 141, *ante*.

up and down, or in and out, like an elbow-joint, and horizontally when the top slide is moved. The weight of these frames is balanced by levers and balance-weights and chains above, and the lower edge of the second frame is furnished with a "feeler" or "guide" to traverse over the original model, and a "drill" driven at a high speed by a light cord, to cut the work or copy; so that by handling the feeler carefully and tracing over the original in all directions a piece of marble or alabaster or wood placed in the machine alongside of the original is cut to a perfect copy by the machine without fear of any mistake, and without any special skill on the part of the operator.

The second machine made by Watt was for making a copy of a bust of reduced size; he called it a "diminishing machine." The machine consists, firstly, of a lathe-bed, with fly-wheel and treadle for obtaining the motive power for driving the drill; secondly, of a stout hollow tube forming a long lever, fulcrumed at one end on a "universal joint," so that the other end can be moved in any direction about the centre. This lever carries a "feeler," or blunt point, near its outer end, and a "drill" near the fulcrum, so that whatever motion the "feeler" has, the "drill" has (say) one-eighth part as much. Thus, if a bust or mask (in this case a plaster cast) is placed on the slide provided for it under the "feeler," and such "feeler" is carefully traced all over it, the "drill" will cut a piece of material placed under it, on the slide provided for it, to the same form, except that it will be one-eighth the size of the original. The lever is balanced. The slides above-named slide on the bed of the lathe, and are moved by a "pantograph," or arrangement of levers, to give one-eighth as much motion to the work to be cut as to the original, so that every dimension shall be in proportion. A further motion is provided for turning round the original and the copy, as is sometimes necessary when under-cutting a "bas-relief," and, of course, when copying the round figure.

M. POWIS BALE.

20, *Budge-row, E.C.*, Feb. 1, 1884.

THE CARPENTERS' EXHIBITION.

SIR,—I really fail to see that Mr. Preston's letter [p. 217] answers me in any satisfactory fashion. I do not think the carpenters as a body will accept the statement that "the main object of the Carpenters' and Joiners' Companies had in inaugurating the exhibition was to develope latent talent." I claim the right, as a man born and bred to the trade, to challenge an assertion thus publicly made. Mechanics are getting extremely suspicious about these City companies, and, without any hesitation, I allege that it was not until the cry for reform arose that the City companies inaugurated these competitions; the "main object" being a pretence to perform those duties imposed upon them by their charters.

Here is a fair issue. Through the *Builder* I beg leave to ask Mr. Preston a question. The Carpenters' Company was formed and chartered to protect and encourage our trade: will Mr. Preston tell me what his company can claim to have done to encourage carpentry during the past twenty-five years?

HENRY DUNKLEY.

INTERNATIONAL HEALTH EXHIBITION.

SIR,—I quite agree with the observations of your correspondent, "Sanitary Engineer" [p. 217, *ante*], as to the unfairness of placing the apparatus or appliances of any exhibitor in the proposed model dwelling to be erected on the site of the exhibition, unless the same had received an award of merit; and I believe if the Committee were to provide such a building as that contemplated, after the various awards shall have been declared, and to fit up the same with a selection of the most approved exhibits, a great public benefit would result. The awards should be made with this end in view, and the dwelling constructed from the foundations to the finish with prize exhibits; and I am quite sure the cost of the same would be fully recouped by the large number of visitors who would be attracted to the "model dwelling." You, sir, would be doing a great service by bringing this suggestion to the notice of the Exhibition authorities, for it appears to me we do not usually see what particular and special results accrue from the various exhibitions frequently taking place in London. I, with many others, am waiting to know what direct and lasting benefit the Fisheries Exhibition will result in, and I have the same thoughts in regard to the International Health Exhibition.

H. H. BRIDGMAN.

SIR,—I noticed the letter in your last issue from "Sanitary Engineer," and quite agree with him in his remarks concerning the house the committee intend building. The exhibitors who have their goods in the house would be more before the notice of the jurors. I hardly think this would be right to the other exhibitors, as the poor, although perhaps more talented, would have "a back seat."

AN INTERESTED ONE.

THE LATE GALE.

SIR,—My attention is drawn to a paragraph in the *Yorkshire Post*, headed "The Late Gale," copied from the *Builder*, in which it says:—"But, that the wind could really operate so forcibly upon the comparatively narrow area of the front of an engine as to overcome its weight, momentum, and mechanical power," &c. Permit me to say that the hindrance to a train is not when *meeting* a strong wind, but when the wind blows very strongly from *one side*, thus affecting the *whole length* of the train.

In the remarkable wind about October 14th, 1881, I travelled from London by a Great Northern fast train, leaving King's-cross at nine a.m.; on the incline between the 97 and 100 mile-stones we were so nearly brought to a stand while exposed to the full force of the *side*-wind, that a man might easily have got out on the lee side and have got into the carriage again; but directly we entered a *cutting*, and were thus protected from the side-wind, we gained pace immensely. We were, however, an hour late at Newark, the time being principally lost between Peterborough and Grantham.

A. S.

TESTS FOR PORTLAND CEMENT.

SIR,—Will you kindly allow me to point out with reference to your notice [p. 189, *ante*] of Mr. Faija's "Portland Cement for Users," that the difficulty of obtaining the correct weight of Portland cement per striked bushel is obviated by having a filler such as Mr. Grant uses in his experiments, and that it is not easy to obtain uniformity in specific gravity tests, although they are largely used.

As to the fact that the coarse particles in Portland cement have little or no setting power, this was ascertained by Mr. Grant years ago.

ERNEST VAN PUTTEN.

DOOR FASTENINGS.

SIR,—Will any of your numerous subscribers inform me where I can procure fastenings for the outside doors of theatres, &c., such as will give way in a panic when pressed from the inside?

A CONSTANT SUBSCRIBER.

HOUSE DECORATORS' CLUB AND INSTITUTE COMPANY.

THE third annual general meeting of this company was held on Thursday, the 7th inst., in the Club Hall, Howland-street, Mr. J. G. Crace in the chair.

It will be remembered that this company was established to provide a club and hall for accommodating various societies connected with the trade, so as to form a central point of communication between employers and *employés*, and to furnish at the same time a healthy means of association between the members of the trade, a library and reading and billiard rooms being provided for improvement and recreation. Since the first meeting, held under the auspices of the Painter-Stainers' Company, who kindly lent their hall for the occasion, many employers and others have assisted by taking up shares, notably Messrs. Crace & Son, J. H. Donaldson, M. C. & F. Cowtan, R. Lyon, and J. C. O'Hara, and the company have leased the premises, 19, Howland-street, where the club has been carried on during the past year with, we are glad to learn, every prospect of success.

The report, showing that material progress had been made during the year, was after discussion adopted, the chairman remarking that their thanks were due to those members whose questions, by thoroughly ventilating the business, brought out the merits of the directors, who had evidently laboured hard for the welfare of the members of the Club.

The Secretary was then re-elected, Mr. G. Grant being elected treasurer, and Messrs. Taylor, Winter, and Maddison, auditors. The retiring directors were re-elected.

The Solicitor, Mr. T. F. Peacock, then read a letter from the architect, Mr. Lewis P. Crace, stating that all preliminary arrangements had been made with the various owners and leaseholders interested, and they might now proceed with the alterations and additions necessary to meet the growing demands of the club.

The Chairman, responding to a cordial and hearty vote of thanks, said he was very pleased to see how much good they had done in establishing a place where they could enjoy themselves in a rational manner, and hoped, in conclusion, they would continue to progress as they had done, and become a benefit to every member of their craft.

A. B.

BRISTOL JUNIOR ARCHITECTS' SOCIETY.

THE annual dinner of the Bristol Junior Architects' Society was held on Tuesday, at the Montague Hotel, Bristol, under the presidency of Mr. J. C. Moncrieff, A.R.I.B.A. (vice-president of the Society).

The loyal toasts having been duly honoured, the health of "the President of the Society" (Mr. Chas. F. Hansom, F.R.I.B.A.) was proposed by Mr. McPherson, and responded to by Mr. E. E. Ford; "Success to the Junior Architects' Society of Bristol" was next given by Mr. W. E. Hill, and acknowledged by Messrs. Bond and Froud; "The Vice-Presidents" were proposed by Mr. Ford, and responded to by Mr. J. C. Moncrieff; "The Chairman," proposed by Mr. Ford; "The Hon. Secretary and Treasurer," proposed by Mr. McPherson; "The Founder of the Society" (Mr. Hill), proposed by Mr. Ford, and replied to by Mr. Hill; "The Council," proposed by Mr. R. C. Sconce, and answered by Mr. Cridland. The toast of "Kindred Societies" was responded to by the Chairman on behalf of the Royal Institute of British Architects, and Mr. W. E. Hill, on behalf of the Architectural Association.

THE INSTITUTION OF BUILDERS' FOREMEN AND CLERKS OF WORKS.

THE members and friends of the Provident Institution of Builders' Foremen and Clerks of Works, to the number of about 120, dined together at the St. James's Hall Restaurant on Saturday evening last, the President, Mr. Mead, in the chair.

The Chairman, in proposing the toast of the evening,—"Success to the Builders' Foremen and Clerks of Works' Institution,"—gave an interesting account of the growth and prospects of the Institution, which was established now more than forty years ago, viz., in 1842. He dwelt upon the great value of the work done by the Institution, and referred with satisfaction to the fact that although last year there was, from various causes, a rather serious falling off in members, the financial position of the Institution was beyond reproach; and it was for builders' foremen and clerks of works to join the Institution and to share in the benefits which it was able to confer on distressed members or their bereaved families.

The toast of "The Governor" (Mr. George Plucknett, J.P.) was proposed from the chair, and acknowledged on Mr. Plucknett's behalf by Mr. Miller, who testified to the great interest which that gentleman had, for so many years, taken in the welfare of the Institution.

Mr. Bedford, one of the secretaries, gave an interesting summary of the financial position of the Institution, which had up to the end of the year 1882 spent upwards of 5,000*l.* in assisting members and their families, while at the present time it possessed funded property to nearly the same amount. He believed that for the sum of 2*l.* per annum paid by each member they were able to afford proportionately greater assistance to their members than any similar society.

Among other toasts proposed were "The Architects," on whose behalf Mr. Fraser replied; "The Builders," "The Visitors," &c., for whom Messrs. Frampton and Cheek responded. Altogether a very pleasant evening was spent, although the apartment in which the dinner was given was apparently devoid of any adequate means of ventilation.

We are glad to hear that of late there has been a considerable accession of new members to the Institution, and we have no doubt that the secretaries will be pleased to give further information about it to all inquirers who will write to them at the offices, No. 9, Conduit-street, W.

UNHEALTHY HOUSES.

BRITISH MUTUAL BANKING COMPANY *v.* HIGGINBOTHAM.

THIS was an action tried in the Brompton County Court on the 29th ult., for rent, the defendant counter-claiming for damages sustained in consequence of the alleged unhealthy state of the house.

Mr. J. Archer was called for the plaintiffs, as was also Mr. Banister Fletcher, who had made a special investigation into the sanitary arrangements of the premises.

Mr. King, the engineer of the London Sanitary Protection Association, and several witnesses who had lived in the house, were called for the defendant.

The Judge (Mr. Stonor) gave judgment for the plaintiffs for the rent claimed, and dismissed the counter-claim with costs.

Professor Newton's Sixth Lecture on Lycian Art Monuments, delivered at University College on the 8th inst., treated of the Lycian language and written character as they are known to us through inscriptions found in Lycia. We will give some notes of it, as well as of the concluding lecture ("On the Tomb at Djölbashi") in our next.

BUILDING PATENT RECORD.*

APPLICATIONS FOR LETTERS PATENT.

Jan. 25, 1884.

2,096. B. D. Healey, Brighouse. Asphalte apparatus.

2,110. A. Drummond, Edinburgh. Sash-bars or astragals.

2,121. A. Drummond, Edinburgh. Glazed structures, &c.

2,129. W. B. G. Bennett, Southampton. Automatic flushing apparatus.

Jan. 26, 1884.

2,173. T. Atkins, Drayton. Affixing knobs to their spindles.

2,176. A. W. Kershaw, Lancaster. Ventilators.

2,178. J. W. Sisson, London. Lock-knob fastener.

2,182. W. St. J. Joyce, Dublin. Fire-grates.

2,187. A. Woods, Northampton. Suspenders for curtains, &c.

2,194. W. B. Carne, Kingsland. Sliding sash-frames.

Jan. 28, 1884.

2,237. J. Walsh, London. House and floor cleaning utensils.

2,244. C. Jones, Derby. Securing scaffolding.

2,246. T. Nield, Sandbach. Supporting window-sashes, &c.

Jan. 29, 1884.

2,301. J. Coulong, Blackburn. Water-closets, &c.

2,323. J. Hatfield, Kew. Artificial stone.

2,338. J. Sherrin, Ramsgate. Window decoration, &c.

2,347. C. M. Tate, London. Ventilating, heating, &c., the atmosphere of rooms, houses, and buildings.

2,348. C. M. Tate, London. Filtering and purifying the inlet air to rooms and buildings.

Jan. 30, 1884.

2,374. J. Mould and J. J. Mould, Birmingham. Zinc roofing.

2,377. W. Beddows, Farnworth. Chimney-pots.

2,379. S. Willett, London. Window-fastener.

2,382. J. Hillyard, Oaklea, and W. K. Hillyard, Newcastle-on-Tyne. Pin for fastening down carpets, &c.

2,394. J. J. Barton, London. Hanging window-sashes.

2,397. J. Finne, Ayr. Hooks for roof gutters, &c.

2,404. G. F. Harrington, Ryde. Cowl arrangements for ventilation.

2,413. D. Griffiths, Erdington. Roofs.

Jan. 31, 1884.

2,435. W. Macvitie, Wylde Green. Sash and casement fastenings.

2,446. J. Badger, New York, U.S.A. Window ventilators. (Comp. spec.)

2,460. D. Page, Folkestone. Lead traps for water-closets, &c.

2,461. C. Crisford, Eastbourne. Joiner's plough, &c.

2,478. A. Younie, Greenock. Kitchen ranges.

2,496. R. Crofthwaite, London. Fire-grates. (Comp. spec.)

2,499. W. Edwards, London. Self-closing doors and gates.

Feb. 1, 1884.

2,524. G. C. Davies, London. Access pipes for house-drains, &c.

2,526. P. Butler, London. Ventilation of houses and buildings.

2,560. S. Coulson, Birmingham, and W. H. Edwards, Wylde Green. Apparatus for opening, closing, and securing windows.

Feb. 2, 1884.

2,576. W. Crook, Salisbury. A smoke and hot-air flue.

2,578. S. Turner, Barrow Haven. A ridge-tile for ventilating.

2,601. H. O. A. E. Gruenbaum, London. Apparatus of respiration for ventilating, &c.

2,604. A. Sweet, London. Water service-valves.

2,608. S. Duprat, Paris. Roofing tiles.

2,614. J. Donkin, Bournemouth. Earth and water closets.

2,634. C. Fowler, Leeds. Glass roofing, &c.

2,640. A. Guattari, London. Manufacture of marble. (Com. by M. Soderini, Florence.)

* Compiled by Hart & Co., Patent Agents, 186, Fleet-street.

Feb. 4, 1884.

2,653. C. D. Riley, Huddersfield. Chimney-tops.

2,686. A. B. Johnson, London. Window-sash fastenings.

Feb. 5, 1884.

2,734. S. U. C. Thompson, London. The tops of chimneys.

2,751. J. Shaw, London. Saving fuel and preventing smoke in open fire-places.

2,774. T. H. Williams, London. Spring hooks for window-blind cords.

2,777. W. Monnery, London. Wall-ties.

2,783. W. J. Penny, Southend. Combined inlet and exhaust sash-frame ventilator.

Feb. 6, 1884.

2,797. J. A. Slater, Birmingham. Window reflector.

2,816. E. Taylor, Blackburn. Preventing down draughts in smoky chimneys.

Feb. 7, 1884.

2,884. W. Cowell, Burnley. Apparatus for heating buildings, &c.

2,920. J. G. Lorrain, London. Ventilators.

SPECIFICATION ACCEPTED,

and open to public inspection for two months:

Feb. 8, 1884.

521. W. H. Renwick, Newcastle-upon-Tyne. Water-closets.

NOTICES TO PROCEED

have been given by the following applicants on the dates named:—

Jan. 29, 1884.

4,614. W. G. de F. Garland, East Molesey. Construction of fences. Sept. 28, 1883.

4,641. G. G. MacWilliam, London. Water-closet basins. Sept. 29, 1883.

5,824. A. M. Clarke, London. Metallic plastering surfaces. (Com. Z. J. Stanley, New York, U.S.A.) Dec. 20, 1883.

5,825. J. Shanks, Barrhead. Water-closets, &c. Dec. 21, 1883.

5,884. E. M. Wood, Natick, U.S.A. Greenhouses. Dec. 28, 1883.

5,925. J. S. Stevens and C. G. Major, London. Spring hinges for doors. Dec. 29, 1883.

Feb. 1, 1884.

5,821. G. M. Morgan, London. Working marble and other stone, &c. Dec. 20, 1883.

Feb. 5, 1884.

4,684. A. J. Boult, London. Ventilating apparatus. (Com. by L. J. Wing, New York, U.S.A.) Oct. 2, 1883.

5,112. J. W. Gibbs, Liverpool. Ventilators. Oct. 29, 1883.

ABRIDGMENTS OF SPECIFICATIONS,

Published during the week ending February 9, 1884.

2,827. W. P. Thompson, Liverpool. Seal traps for wash-basins, water-closets, &c. (Com. by A. Edwards, Ashbury Park, U.S.A.) June 7, 1883. Price 4d.

An iron trap is used, which is filled with mercury. This becomes oxide of mercury, and forms a poisonous barrier to all forms of organisms. (*Pro. Pro.*)

2,828. G. Wedgwood, C. F. Wedgwood, I. Wedgwood, and G. A. Marsden, Etruria. Ornamenting bricks, tiles, and other fictile articles. June 7, 1883. Price 2d.

The templates are made of strong oiled paper. (*Pro. Pro.*)

2,838. F. G. Lynde, Melton Mowbray. Latches for doors, cupboards, windows, &c. June 7, 1883. Price 2d.

These consist of a ball partly projecting through a slot in the front of a box in the door, &c., which engages in an aperture in the frame. (*Pro. Pro.*)

2,845. J. McConnell, Ballymena. Metallic cement. June 7, 1883. Price 2d.

This is made of brimstone, black powdered antimony, and plumbago. (*Pro. Pro.*)

2,886. S. C. Davidson, Belfast. Stoves or air heating apparatus. June 9, 1883. Price 8d.

This is an improvement on Patents 4,773 of 1877 and 968 of 1880 in fixing the stoves to burn gas instead of coal, &c., and in arranging a lining on the sides of the fireplace, within which the air is heated before it reaches the gas-burners.

2,898. S. Chandler and J. Chandler, London. Water waste-preventers. June 11, 1883. Price 2d.

A lift-up valve is combined with a syphon, and the cistern can be emptied by either. (*Pro. Pro.*)

2,921. C. Major, Bridgwater. Roofing tiles. June 12, 1883. Price 6d.

These tiles have undercut or recessed parts at the upper top corners to interlock with corresponding parts in the adjacent tiles.

2,929. F. Piercy, London. Water-closets. June 12, 1883. Price 6d.

A flexible pipe is connected to the centre of the seat cover, on the underside of which are packing rings to fit closely on the top of the basin and thus make it air-tight when the cover is closed. The handle is then lifted through an aperture in the cover, and any foul gas is carried off through the pipe.

2,932. J. W. Holland, London. Construction and arrangement of cowls, exhausters, or ventilators for chimneys, &c. June 12, 1883. Price 8d.

The essential part is the fitting a larger air-tube round the flue and bending over the tops of both the tubes, while on the outer tube is a revolving cowl with a vane.

2,943. W. P. Thompson, Liverpool. Fastening or clamping apparatus applicable for builders' scaffolding. (Com. by C. Mansion, Paris.) June 13, 1883. Price 6d.

A clamp made of two semicircular pieces jointed together is passed round up the right pole, and a chain is attached thereto by a ring. The chain is then passed round the horizontal pole, then round the upright pole, and again round the horizontal one, and secured to the ring.

2,967. J. E. Manock, Heywood. Stench-traps. June 14, 1883. Price 6d.

The upper portion of the box which carries the "grid" is made separate from the lower portion, which carries the "trap."

2,969. R. McCombie and W. Seaman, London. Water-closet basins. June 14, 1883. Price 6d.

These are rather flat basins, and the inlet arm is placed low down therein. The chief supply of water enters the basin at the level of the water, while other smaller streams are directed above and below the water in the basin. The outlet is made larger than is usual.

3,013. W. Ayres, London. Stench-trap for drains, &c. June 18, 1883. Price 6d.

The trap frame has a gutter in which flanges on the upper edges of the trap drop and form a seal in addition to the usual seal below.

MEETINGS.

MONDAY, FEB. 18.

Royal Institute of British Architects.—Mr. Killingworth Hedges, A.-M.I.C.E., on "Precautions to be adopted on Introducing the Electric Light into Houses." 8 p.m.

Royal Academy.—Mr. G. Aitchison, A.R.A., on "Colour applied Inside Buildings: Marble and Mosaic." 8 p.m.

Society of Arts.—Mr. R. W. Edis, F.S.A., on "The Arrangements, Aspects, Design, and General Planning of London Houses." (Cantor Lecture.) 8 p.m.

London Institution.—Mr. J. Bryce, M.P., on "An Ideal University." 5 p.m.

TUESDAY, FEB. 19.

Institution of Civil Engineers.—(1) Adjourned Discussion on Mr. Conder's paper on "Speed on Canals"; (2, time permitting), Mr. S. W. Barnaby on "Hydraulic Propulsion." 8 p.m.

St. Paul's Ecclesiological Society.—The Rev. S. M. Mayhew on "St. David's Cathedral." 7.30 p.m.

Royal Institution.—Dr. Archibald Geikie, F.R.S., on "The Origin of the Scenery of the British Isles." 3 p.m.

WEDNESDAY, FEB. 20.

British Archæological Association.—Mr. W. H. Butcher on "The History of the Castle of Devizes." 8 p.m.

Society of Arts.—Dr. Hyde Clark on "Reclamation of Land on the North-Western Coast of England." 8 p.m.

Royal Meteorological Society.—(1) Mr. W. Marriott on "The Great Storm of Jannary 26th, 1884"; (2) Prof. E. D. Archibald on "The Height of the Neutral Plane of Pressure, and Depth of Monsoon Currents in India"; (3) The Hon. F. A. Rollo Russell, M.A., "On the Sunrises and Sunsets of November and December, 1883, and January, 1884." 7 p.m.

THURSDAY, FEB. 21.

Royal Academy. Prof. C. T. Newton on "The Monuments of Ancient Art which have been discovered between the time of Winckelman and 1850." 8 p.m.

Society of Antiquaries.—Mr. Edwin Freshfield on "The Book of Records, History, and Inventories of St. Stephen's, Coleman-street." 8 p.m.

Institution of Civil Engineers.—Prof. Fleeming Jenkin on "Gas and Caloric Engines." 8 p.m.

London Institution.—Prof. R. S. Ball, F.R.S., on "The Doctrine of Evolution applied to the Solar System." 7 p.m.

Society of Engineers.—Mr. J. W. Wilson, jun., on "The Work of the Drawing Office." 7.30 p.m.

FRIDAY, FEB. 22.

Royal Institution.—Sir Frederick Bramwell on "London (below Bridge) North and South Communication." 9 p.m.

Institution of Civil Engineers (Students' Meeting). Mr. E. J. M. Davies on "The Qualities of Metal for Various Purposes." 7 p.m.

Miscellanea.

Leathersellers' Hall.—This hall has been re-decorated by Messrs. Battam & Heywood. In the banqueting-hall the panelled ceiling is gilt solid, with hand-painted ornaments in panels. The jewels surrounding the ceiling are decorated with tracery work; the deep cove is also gilt solid and decorated with festoons of leaves, wreaths, &c.; the walls are set out in series of panels, with ornamental pilasters, surmounted with pediments and vases, decorated in gold and colours; the panels are covered with rich gold colour brocatelle silk. In the reception room the enriched tracery ceiling is decorated in an elaborate manner in gold and hand-painted work in various tones, the cornices dealt with in similar colours and gold, and the whole of the walls above the oak dado covered with rich crimson silk damask. The smoking-room ceiling is divided into a series of panels; the mouldings gilt solid, with bosses; the panels are painted in various tints; a deep frieze is decorated with hand-painted work; the walls are hung above the oak dado with Japanese paper. The painted ceiling of the entrance-hall and corridor is decorated in colours and gold, and ornamented with hand-painted work; the cornice decorated in colours, picked in with gold; the walls covered with rich stamped leather paper above oak dado. In the lavatories, lobbies, &c., the ceilings and walls are executed in workmanship and design of proportionate elaboration.

British Archæological Association.—At the fifth meeting of the session, held on the 6th inst., the chair was occupied by the Rev. S. M. Mayhew. Mr. McIntyre North exhibited a sketch of some remains of old Winchester House, Southwark, recently discovered. Mr. Loftus Brock, F.S.A., described a series of Roman Consular coins in silver, and referred to the high artistic merit of their designs. Mr. Cecil Brent, F.S.A., exhibited a fifteenth-century roll, setting forth in chronological order the principal events of early history, which were read by Mr. W. de Gray Birch, F.S.A. Mr. A. B. Wyon read a paper, giving an account and description, illustrated by casts, of the various seals used by Henry VI., as king of France, including three which have not been hitherto known; and also of a seal in the British Museum, much obliterated, attached to letters patent of Henry VI., which Mr. Wyon proved to be that of Philip, Duke of Burgundy, and used A.D. 1425, for the Great Seal of Henry VI. The proceedings were brought to a close by some fitting remarks made by Mr. Thos. Morgan, F.S.A., treasurer, on the loss to archæology by the death of Mr. J. H. Parker, C.B., of Oxford.

The Gambetta Monument.—The commission appointed for the erection of a monument to Léon Gambetta has published the programme for the competition. Although only French artists may participate in it, its details are not without interest to others. The cost of the monument is not to exceed 350,000 francs. Designs are to be sent in between May 25th and June 1st, and they will be publicly exhibited from June 3rd to 15th. The authors of the three best projects will be invited to take part in a second competition, in which the same jury will adjudge. In this second competition the author of the first prize receives a premium of 10,000 francs, or the execution of the project, and the two others prizes of 6,000 francs and 4,000 francs respectively. Should the second competition be without satisfactory result, the three competing artists will each receive prizes of 3,000 francs. The jury consists of fifteen members, ten of which are selected by the commission and five by secret voting by the competitors themselves.

Exhibition of Thermometers. — The Council of the Royal Meteorological Society have arranged to hold at 25, Great George-street, S.W., by permission of the President and Council of the Institution of Civil Engineers, on the evening of March 19th next, an Exhibition of Thermometers. The committee will also be glad to show any new meteorological apparatus invented or first constructed since last March, as well as photographs and drawings possessing meteorological interest.

"Adjustable Electric Thermometers."—Messrs. J. T. Gent & Co., of Leicester, write (with reference to a paragraph in our last), that they have made "Adjustable Electric Thermometers" for at least ten years.

Competition for a Natural History Museum at Hamburg.—The Senate of Hamburg has invited competition for a natural history museum. There is to be a preliminary competition with sketches to a scale of 1 in 200, and a perspective representation. The authors of the five best designs will each receive prizes of 1,000 marks, and acquire, at the same time, the right to take part in the closer competition, for which they will be paid a honorarium of 4,000 marks each. The programme for the second, deciding competition stipulates for completely worked out plans in all their artistic and descriptive details, but at the same time for a written guarantee of the competitor that the cost of the work, in case he is charged with its execution, will not exceed the sum of 900,000 marks, his honorarium being retained as a caution money. The successful architect in this second competition receives, in case the work should not be carried out, 1 per cent. of the above estimated cost, and 3 per cent. if the museum is built. The competition is stated to be unlimited (? international). Plans must be sent in by April 30, to the "Bureau der Ober-Schulbehörde, Steinthorplatz, Hamburg," where also the conditions and a plan of the building site may be obtained.

London and Middlesex Archæological Society.—At a meeting of this Society, at 4, St. Martin's-place, Trafalgar-square, last Monday evening, the 11th inst., a paper written by Alderman Staples, F.S.A., on "Members of the Goldsmiths' Company who have been Aldermen of the Ward of Aldersgate," was read by Mr. E. W. Brabrooke, F.S.A., in the unavoidable absence of the Alderman. This was followed by some remarks by Mr. George Lambert, F.S.A., on the antiquity and importance of the Goldsmiths' Company. A paper was also read on "Recent Archæological Researches in London and Elsewhere," by Mr. J. E. Price, F.S.A., secretary, illustrated by drawings and plans. The author alluded to the discoveries recently made near the Tower of London, part of the old wall of the City being brought to light through the excavations connected with the railway works at Trinity-square and Tower-hill. He also gave an interesting description of the recent discovery, in the city of Bath, of ancient Roman baths, and extensive remains of other buildings connected therewith, illustrated by photographs. He exhibited a portion of the leaden lining of the bath five-eighths of an inch thick, which has since been presented to the new Roman and Saxon Gallery of Antiquities in the British Museum.

Cremation.—Dr. Cameron has secured the 30th of April for the second reading of his Bill regulating cremations. The Bill, which also bears the name of Sir Lyon Playfair, who gave evidence before the Royal Commission on intramural burials, has for its object the strict supervision and regulation of all crematoriums, public or private, which may be established in the country. At present, cremations may take place, as they are not forbidden by law, but they are not under the careful supervision which Dr. Cameron's Bill will propose to extend to them.

Association of Municipal and Sanitary Engineers and Surveyors.—A meeting for the Northern District will be held at South Shields this Saturday, the 16th inst., when the following papers will be read and discussed:—"Recent Street Improvements in South Shields," by Mr. Matthew Hall, C.E., Borough Surveyor, South Shields; "Hospital Construction," by Mr. A. Campbell Munro, M.B., Medical Officer of Health, South Shields. The members will afterwards visit (under the guidance of Mr. Hall) the extensive street improvements recently executed; the Tramway and Corporation Stables; the new Infectious Diseases Hospital; and the Marsden quarries.

Weston-super-Mare.—At a largely-attended public meeting at Weston-super-Mare, a resolution was unanimously passed in favour of a scheme for a pier over a mile in length, at an estimated cost of 80,000*l.*

The St. Clare Estate, Walmer.—W. & T. Denne beg to thank the fifty-three competitors for their designs. The committee have awarded the premiums to the following gentlemen, viz., 1st, Mr. W. Pope, (Antiquary); 2nd, Mr. A. J. Style (Cross and Circle); 3rd, Messrs. Usill & Hodginson (Invicta.)

Gift to Sheffield. — The Sheffield Town Council have formally accepted the gift of the late Mr. J. Newton Mappin of a collection of pictures valued at 80,000*l.*

TENDERS.

For alterations and additions to the Richmond Workhouse, Surrey. Mr. Edward Maynard, architect, Westminster. Quantities supplied:—

Kent Bros.	£5,780 17 11
Magee & Co.	5,149 13 6
Lucas & Son	4,845 0 0
J. Longley	4,777 0 0
Sweet & Loder	4,767 0 0
Oldridge & Sons	4,736 10 0
Carless & Co.	4,653 0 0
J. H. Jarvis	4,648 0 0
J. & W. Hickinbotham	4,575 0 0
C Maton	4,500 0 0
Priestley & Gurney	4,400 0 0
D. & A. Brown	4,339 0 0
Howell & Son (accepted)	4,309 0 0

For taking down and rebuilding Crowle Vicarage House, near Worcester, for the Rev. J. Stephenson. Messrs. Henry Roe & Sons, architects, Worcester:—

J. Inwood, Malvern (accepted)	£1,200 0 0

For foundations for new premises and machinery for Messrs. Rowe Bros. & Co., at Canon's-marsh, Bristol. Mr. Herbert J. Jones, architect, Bristol:—

James	£1,700 0 0
Stephens & Bastow	1,500 0 0
Humphreys	1,482 17 4
Rossiter	1,467 0 0
Brock & Bruce	1,440 0 0
Eastabrook & Sons	1,429 0 0
Cowlin & Son	1,385 0 0
Lewis	1,354 0 0
Beavan	1,323 13 0
Hatherly	1,297 0 0
Davis	1,290 0 0
Crocker	1,259 0 0
Walters	1,200 0 0
Church	1,165 0 0
Howell & Son, Bristol & London	1,100 0 0

For rebuilding No. 22, Castle-street, Hastings, for Mr. T. Wallis. Mr. Arthur Wells, architect, Hastings:—

F. Avis, Hastings	£446 0 0
W. J. Rodda, Hastings	435 0 0
C. & E. Harman, Hastings	411 16 0
A. H. White	410 0 0
J. Howell & Son, Hastings (accepted)	395 0 0

For building gate lodge at Old Roar, near Hastings, for the Exors. of the late George Clement. Mr. Arthur Wells, architect:—

Alfred King, Hollington (accepted)	£204 10 0

[No competition.]

For footpath improvements on Church-hill and Bromley-road, for the Beckenham Local Board. Mr. Geo. B. Carlton, engineer and surveyor:—

T. W. Jones, Beckenham	£1,015 0 0
E. & W. Iles, Wimbledon	963 0 0
Wheeler & Hindle, Bankside	933 0 0
G. B. Marshall, Brighton	886 0 0

[Engineer's estimate, £956 7s. 0d.]

For the erection of fire-escape staircase at the Southall school, for the Guardians of the Poor of the Parish of St. Marylebone. Messrs. H. Saxon Snell & Son, architects:—

Wm. Bamford, London	£330 0 0
Wm. P. Woodbridge, Maidenhead	298 0 0
Wall Bros., London	249 0 0
G. Gibson, Southall	235 0 0

For the erection of fire-escape staircase at the Fulham-road workhouse, for the Guardians of the Poor of the St. George's Union. Mr. H. Saxon Snell, architect:—

C. Batchelder	£284 0 0
Charles Wall	258 0 0
Wm. Bamford	240 0 0

For the erection of an iron bridge between men's and women's dormitories of the Fulham-road workhouse, for the Guardians of the Poor of the St. George's Union. Mr. H. Saxon Snell, architect:—

C. Batchelder	£236 0 0
Fraser & Co.	195 0 0
Edmund Toms	185 0 0
Jukes, Coulson, Stokes, & Co.	175 0 0
Charles Wall	166 0 0
Wm. Bamford	150 0 0
Benham & Sons	148 0 0
May Bros.	136 0 0
Potter & Sons	130 0 0

For erection of forty horse-boxes at Kempton Park racecourse:—

G. Gibson	£1,673 0 0
G. Reavell	1,630 0 0
W. Watson	1,550 0 0
W. Cullingham	1,549 0 0
A. Bushell	1,530 0 0
B. Cook	1,495 0 0
W. Goldham (accepted)	1,420 0 0
W. Lane	1,320 0 0

For revolving shutters for tramway sheds, Darlaston:—

J. Stones, Ulverston (accepted)	£173 0 0

For alterations and additions to farm buildings at Armytage Arms, Clifton, near Brighouse, for Sir George Armytage, Bart. Mr. R. F. Rogerson, architect, Brighouse:—

Masons.

Matthew Mortimer, Moor Side, Cleckheaton	£219 10 0
John Cross & Son, Brighouse	212 10 0
John Bottomley, Brighouse	199 0 0
A. Drake, Hartshead	169 0 0
Charles Fearnley,* Brighouse	168 10 0

Joiners.

Thomas Bottomley, Brighouse	143 0 0
John Hirst, Clifton	139 19 0
J. Speight, Scholes, Cleckheaton	138 9 0
Benjamin Sykes & Sons, Brighouse	137 0 0
Job Crowther,* Brighouse	136 0 0

* Accepted.

For additions to a house at Guernsey, Mr. Newton, architect. Quantities supplied by Messrs. Palmer & Ruault:—

Stephens & Bastow	£14,738	0	0
Bangs & Co.	14,692	0	0
Maides & Harper	13,735	0	0
Foster & Dicksee	10,410	0	0

For alterations and additions to the Canterbury Theatre of Varieties, Westminster Bridge-road. Mr. Frank Matcham, architect, Rugby Chambers, Bedford-row. Quantities by Mr. F. Thomson:—

Dove Bros.	£2,105	0	0
Patman & Fotheringham	2,028	0	0
Wall Bros.	2,025	0	0
Bangs & Co.	1,982	0	0
Mark Patrick & Son	1,969	0	0
Toms	1,878	0	0
Shurmur	1,710	0	0
Ford & Everett	1,585	0	0

[Corrected list, in lieu of the list inserted a fortnight ago.]

For a new warehouse to be built in the rear of No. 362, Edgware-road, for Mr. J. J. Thomas. Mr. Robert J. Worley, architect. Quantities by Mr. R. C. Gleed:—

J. Saunders	£1,989	0	0
Ellis & Turner	1,980	0	0
Braid	1,880	0	0
Marks	1,615	0	0
Turtle & Appleton	1,545	0	0
G. Green	1,497	0	0
W. Smith	1,493	0	0
E. Lawrance & Sons	1,453	0	0

For constructing the Hury Reservoir, for the Stockton and Middlesbrough Corporation Water Board. Mr. D. D. Wilson, engineer:—

G. Stevenson, Eckington	£152,385	8	2!
R. Simpson, Preston	143,567	16	3
Whitaker Bros, Leeds	135,209	8	1
Walter Scott & Co.,* Newcastle	112,658	7	9
Crabtree Bros., Oxenhope	110,201	5	10
S. & W. Pattinson, Ruskington	100,035	5	2
J. Johnson & Son, Middlesbrough	98,715	6	8
S. Pearson & Son, Bradford	98,387	1	3
Kellett & Bentley, London	98,250	0	0
J. Schofield, Dewsbury	97,157	7	6!

[Engineer's estimate, 119,860*l.* 8s. 7d.]
*Accepted.

For wood-paving, King-street, Great Yarmouth, for the Corporation. Mr. J. Wm. Cockrill, Borough Surveyor:—

W. Hurst, London	£1,950	0	0!
J. F. W. Bray, Yarmouth	1,428	0	0
Improved Wood-Paving Company, London	1,410	0	0
Hayward, Eastbourne	1,291	17	6
Duffy & Son, London	1,150	0	0
Cork & Beech, Yarmouth	1,100	0	0
Nudd, Yarmouth	1,057	0	0
J. Batch, Norwich (accepted)	963	0	0!

[Surveyor's estimate, 1,175*l.*]

For the completion of three houses and one shop adjoining the Elephant and Castle, Victoria Park, for Mr. R. E. Clarke. Messrs. Broadhurst, surveyors:—

Wood	£1,159	0	0!
Metheral	875	0	0
Jolley	818	0	0
Bray (accepted)	805	0	0
Perches	639	0	0
Muncey	619	0	0!

For the erection of a house in Derby-road, Bournemouth, for Mr. J. Dean. Messrs. Kemp-Welch & Pinder, architects:—

Jenkins & Son (accepted)	£2,970	0	0

For the erection of the Railway Mission Hall, and alterations to house adjoining, in Kensal-road, Westbourne Park, for the committee. Mr. R. H. Hill, architect:—

The Building, Fitting, and Furnishing Company, City-road	£985	0	0
Oldrey, Kensal-road	875	0	0
Holland, Poplar	864	0	0
Harris & Wardrop, Limehouse	850	0	0
Holliday & Greenwood, Loughborough Junction	837	0	0
*Jolly & Sons, Victoria Park	792	0	0
Allen & Son, Kilburn (accepted)	757	0	0

* Too late.

For interior fittings in teak wood for the National Bank of Wales, Swansea. Mr. J. Buckley Wilson, architect, Swansea:—

Thomas, Watkins, & Jenkins, Swansea (accepted)	£181	0	0

For the execution of ale store and works below ground line of new 120 quarter malting at The Brewery, Faversham, Kent, for Messrs. W. E. & L. Rigden. Mr. Richard Waite, architect, Duffield, Derby. Quantities supplied:—

A. J. Smith, Stratford	£1,321	0	0
T. Ames, Birchington	1,173	0	0
Foster & Dicksee, Rugby	1,150	0	0
R. Paramor & Sons, Margate	1,100	0	0
H. Spencer, Luton	1,097	0	0
H. Stiff, Dover	1,082	0	0
R. M. & H. Whiting, Faversham	1,041	0	0
W. J. Wiles, Dover	997	0	0
M. A. Whelch, Dover	990	0	0
Howland Bros., Ashford	990	0	0
T. Cornelius, Whitstable	989	0	0
G. H. Denne, Deal	987	0	0
R. G. Battley, Old Kent-road	979	0	0
Wallis & Clements, Maidstone	870	0	0
L. Shrubsole, Faversham (accepted)	849	0	0

New Town-hall, Eastbourne.—In the list of tenders printed by us last week (p. 219), the amount of Messrs. Avard's tender should have been £34,500, instead of £34,600, and that of Messrs. Bissett £34,050 instead of £34,000. Messrs. Dore & Son's tender, amounting to £28,475, has been accepted. The quantities were supplied by Mr. W. A. Phipson, of Birmingham. We printed the list as received.

Special Notice.—Lists of tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, Strand, W.C., not later than four p.m. on Thursdays.

TO CORRESPONDENTS.

H. S. (all correspondence ought to be accompanied by name and address of writer, whether for publication or not. We have had to decline several letters on account of want of any kind of authentication).—H. W. (ditto).—Belsize (next week).—M. U. (too late for this week).—R. W.—H. M. M.—R. L. L.—W. E. (next week).

Correspondents should address the Editor, and *not* the Publisher, except in cases of busines.

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

PUBLISHER'S NOTICES.

THE INDEX and TITLE-PAGE for Volume XLV. (July to December, 1883) were given as a Supplement with the number of January 12, and A COLOURED TITLE-PAGE was issued the following week, in substitution for that published previously.

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The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

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Its construction allows of the angle of light being readily altered so as to reflect in any desirable direction.